THE ELECTRICAL WORLD

A Weekly Review of Current Progress in Electricity and its Practical Applications.

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The Electric Light on Board the Ferry Boat Fulton.

The electric light has become as useful and as desirable on water as on land. Its valuable qualities and many advantages have paved its way to general favor—we might say preference—as an illuminant on b oard steam vessels of every description. The success which it meets, and the satisfaction which it affords in every case where it is adopted, tend to enlarge still more its sphere of usefulness, so that it can even now be counted upon as having begun a career of extensive application.

There are many interesting examples of installations on large steam vessels, and we have given our readers an idea of their character in the details published in THE ELECTRICAL WORLD concerning the lighting of the ocean steamers Arizona and Normandie, and more recently in reference to the lighting of the sound steamer Pilgrim. The examples of installations made on small vessels are not so numerous, because such installations have been somewhat restricted in number by the doubts as to their economy and success. The small marine installations of the electric light have usually been confined heretofore to steam pleasure yachts, where the questions of convenience and comfort are paramount to all other considerations.

However, the applicability of the electric light on a small scale under commercial conditions has been thoroughly demonstrated by the successful use of the incandescent light for over a year on several of the ferry boats on the North River, which ply between New York and Jersey City. The splendid success realized in every case is greatly to the credit of the United States Electric Lighting Company, of New York, whose system is used.

On Monday evening, the 6th inst., this company put in successful operation a similar installation on board the ferry boat Fulton, of the Union Ferry Company, plying between New York and Brooklyn. Knowing that a complete account of an installation of this kind would interest our readers, we have taken especial pains to obtain minute details on the subject. By the courtesy and kindness of Mr. L. E. Curtis, secretary of the United States Electric Lighting Company, we have been enabled to prepare the diagrams herewith (Figs 1, 2, 3), which show the distribution of the lights and the arrangement of the conductors.

Fig. 1 is a diagram of the hold of the Fulton, showing the dynamo with its special engine and condenser, which are placed on one side of the engine. Fig. 2 is a diagram of the main deck and Fig. 3 a diagram of one of the pilot-houses, showing the distribution of the lights.

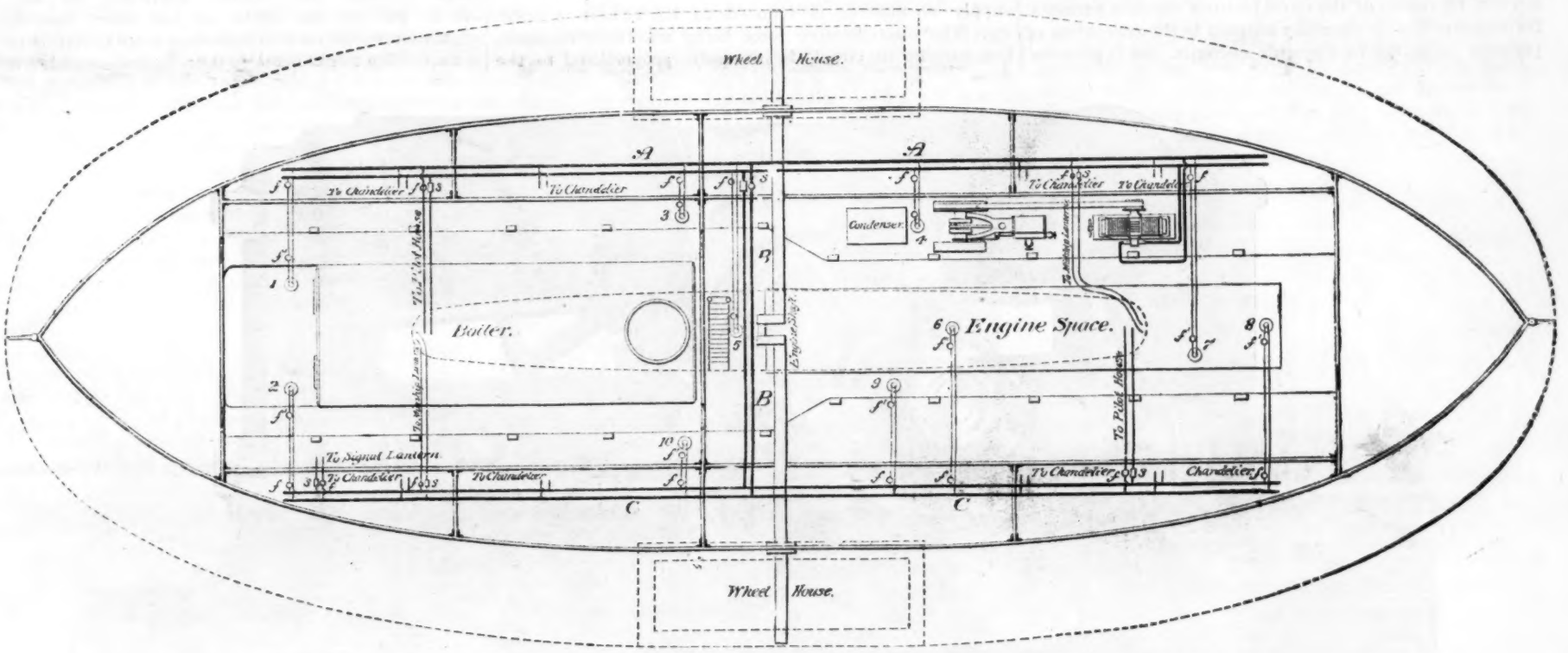

Fig. 1.—PLAN OF HOLD, SHOWING RELATIVE POSITIONS OF THE APPARATUS.

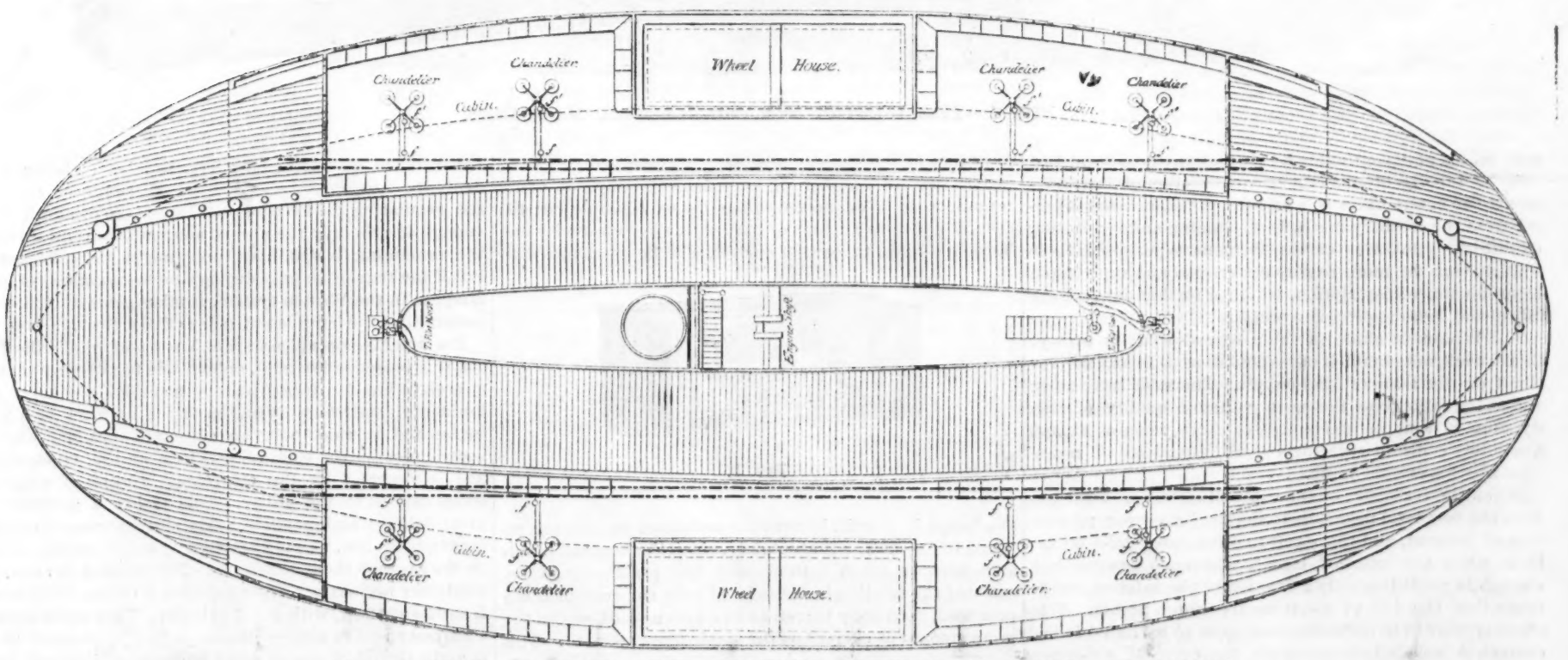

Fig. 2.—PLAN OF MAIN DECK, SHOWING POSITION OF LIGHTS IN CABINS.

The plant comprises 63 lights. The current is furnished by a Weston dynamo-electric machine (Fig. 4) of the type specially adapted for 60 lights. This machine, as seen in the figure, is of excellent design, both electrically and mechanically, and its appearance is characterized by every indication of exquisite and skilled workmanship. It is of the general Siemens type, though it differs from it in important particulars. The ordinary Siemens machine is faulty in having the cores of the field-magnets too close together, because by this arrangement the magnetic distance to be crossed by the lines of magnetic force is as short as, or even shorter than, that between the cores at the pole pieces. The consequence is that a large number of lines of force complete their magnetic circle by passing directly from one core to the other, and are not useful in increasing the intensity of the magnetic field, though nevertheless current energy is consumed in their production. In the Weston machine, the field-magnet cores of one side of the field are separated widely from those of the other side, and it results that the magnetic distance from core to core is as great as that from one pole piece to the other; so that with the presence of iron in the armature to diminish the magnetic distance still further, a greater number of the lines of force cross from one side to the other at the pole pieces and prove of benefit to the magnetic field of the machine, thus utilizing the magnetic energy to better advantage.

The armature of the Weston machine is also of special interest by reason of the novel features which it presents. Its construction is specially adapted to the prevention of parasite induction or Foucault currents, and is provided with means of "ventilation," by which any heat developed will be rapidly dissipated. The connection of the armature to the commutator is, moreover, peculiar, being different from the ordinary methods of winding and connecting cylindrical armatures of the Siemens type. As these features can be more readily understood and appreciated by an illustrated description, we leave further details for a future and more appropriate occasion.

The Weston machine is shunt-wound—that is to say, its field-magnet circuit is connected so as to form a derivation from the main or light circuit. The most interesting and at the same time the most valuable quality of this dynamo is that its electromotive force remains almost absolutely constant regardless of all variations of resistance above a certain value.

When the resistance of the external circuit is made too low, the magnetic field fails to derive its proper proportion of current, and the electromotive force falls down. It is when the external circuit resistance becomes low enough to constitute only a fraction of the internal resistance that this fall of electromotive force occurs. This effect appears to be somewhat analogous to the rapid fall of current in voltaic batteries when the external resistance falls below that of the internal resistance. As long as the external resistance does not fall below about one-half the internal resistance the electromotive force remains constant, and from this point the resistance may be increased to infinity without any effect on the electromotive force. Mr. Weston obtains this valuable result by a careful adaptation of the field to the armature, and by providing the proper ratio between their resistances, while yet securing the number of turns of wire necessary in each, in order to produce the effect. As the resistance of the armature is extremely low, the limit at which the electromotive force lowers is never reached in practice, and the Weston dynamo may therefore be regarded as having practically a constant electromotive force. This being accomplished, the matter of regulating the supply of current is reduced to its utmost simplicity. The electromotive force being absolutely constant, the current in circuit is inversely proportional to the resistance of the circuit, according to Ohm's law. Now, given a certain number of incandescent lamps of equal resistance to be connected in parallel or multiple circuit; then, if a certain amount of current is developed with one lamp in circuit, twice that current will be produced with two lamps in circuit, because the resistance has become reduced to one-half, not absolutely, since the internal resistance must be taken into account, but practically so, because of the small value of this. Twice the current being produced, each lamp therefore receives one-half, or just the same amount of current as the single lamp received. This is likewise the case with any number of lamps added in parallel circuit—the resistance diminishes proportionally, so that more current is thrown into the circuit, and each lamp receives practically the same share.

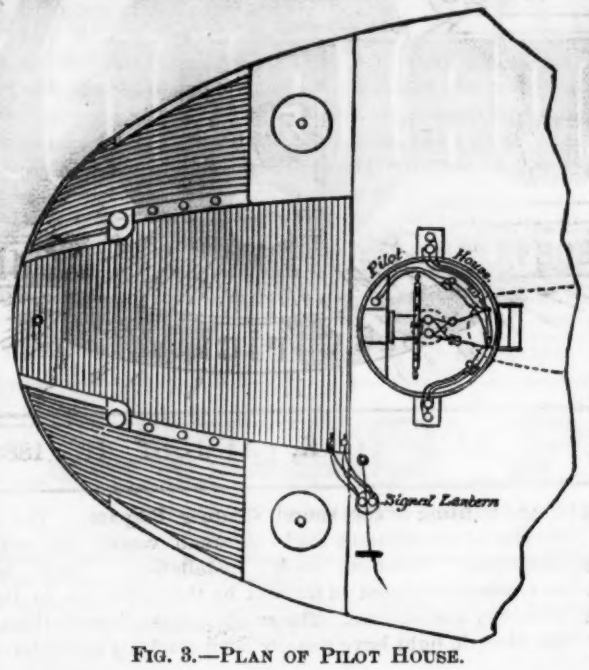

FIG. 3.—PLAN OF PILOT HOUSE.

The Weston machine used on board the Fulton is run at its normal speed of 1000 revolutions, and develops a normal electromotive force of 60 volts. The resistance of the incandescent lamps cold is 75 ohms, hot 40 ohms. The internal resistance of the dynamo is less than .01 ohm, while the lowest resistance of the external circuit, which is when all the lamps are in circuit, is ($\frac{4}{60}$) about .6 ohm, or about sixty times the internal resistance. Accordingly the resistance of the external circuit would have to be reduced sixty times or more before becoming low enough to cause the fall of electromotive force above referred to. The machine regulates itself perfectly and furnishes the precise quantity of current required for the number of lamps in circuit. The lamps may be cut out or inserted in the circuit, either in succession or at once, without in the least disturbing those left in use. This method of regulation is not only more convenient than others, since it dispenses with all the complications of resistance coils, switches, relays, etc., but it is far more effective and prompt than they are. When the electromotive force is made to vary in the machine, as in other systems, by resistance introduced in the field circuit or by changes of speed, so as to suit the exigencies of the circuit, the change of current must evidently occur in the circuit before the regulating device which is affected by it can come into operation. If a large number of lamps happened to be cut off or put on the circuit at the same instant, the regulation would need to take place more promptly or else a fluctuation might occur in those lights remaining in use. For instance, on cutting off a large number of lamps suddenly the electromotive force would suddenly rise and the regulating device could not cause it to diminish soon enough to pass only the normal amount of current through the remaining lamps, and these might be endangered. But if the regulation only depends on the resistance of each lamp, as in the Weston system, it takes place at the very instant that the lamp is put on or off the circuit.

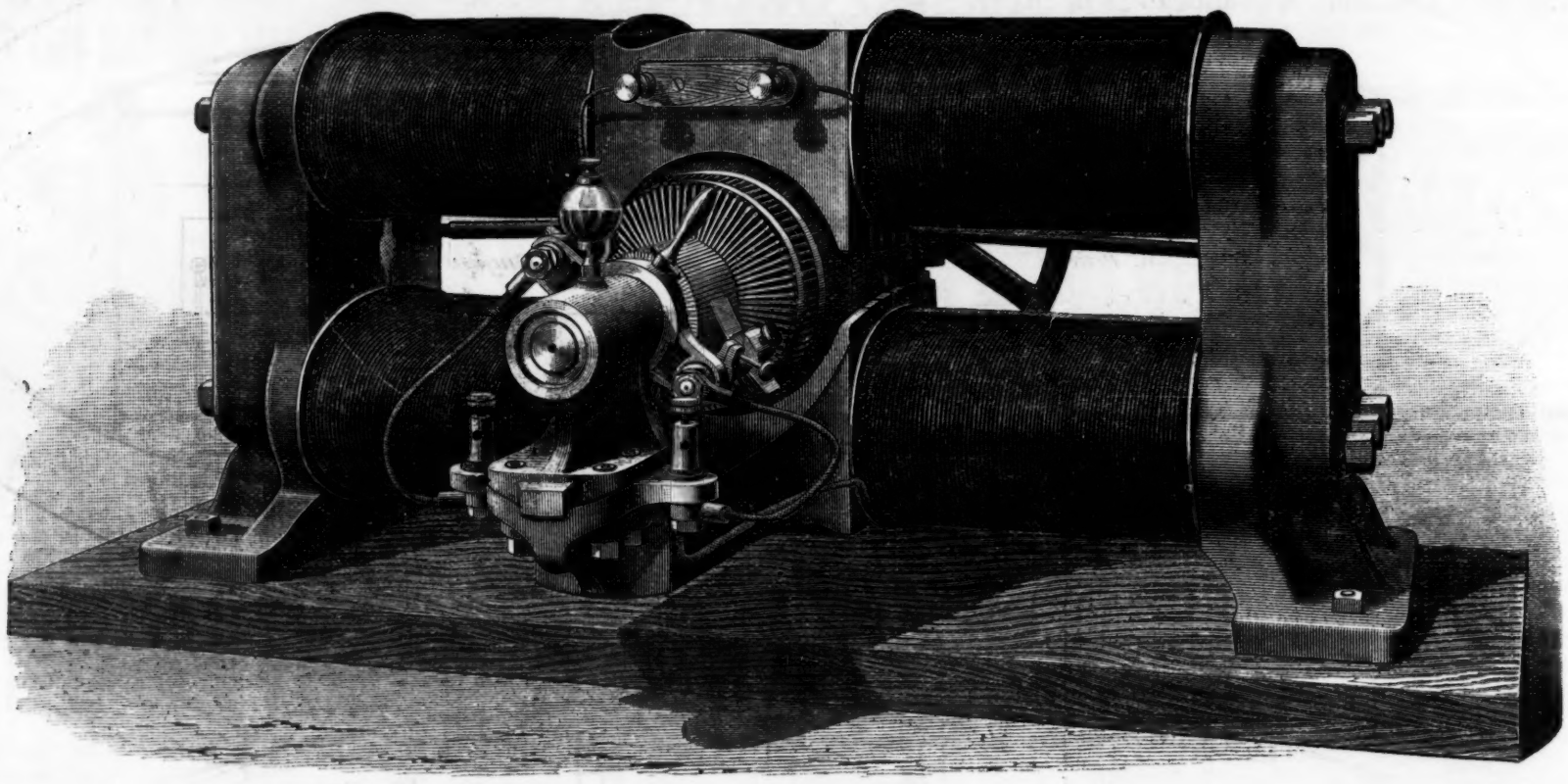

FIG. 4.—THE WESTON-DYNAMO-ELECTRIC MACHINES.

FIG. 5.

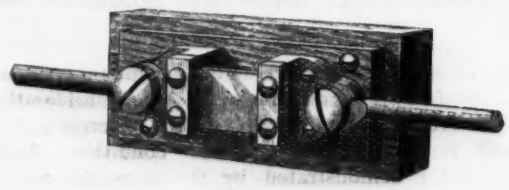

FIG. 6.

The machine occupies a space 5 × 4 feet, and in the Fulton it is placed in the hold, on one side the driving engine, as seen in Fig. 1. It is driven by a special engine of the horizontal stationary type, having a cylinder of 8 × 10 inches and provided with an automatic cut-off. The eccentric moving the slide-valve is loose on the crank-shaft, and is operated by the centrifugal motion of weighted levers carried by the pulley. This makes a governor of great delicacy and precision. The steam pressure available is extremely low, varying between 12 and 20 pounds, being on the average about 15 pounds. This renders the use of a condenser necessary. The condenser is of the well-known Knowles pattern, with 8 × 7 cylinder. The engine runs at a normal speed of 250 revolutions with the pressure of 15 pounds, though the same speed has been maintained even when the pressure was allowed to fall down below 12 pounds. The driving pulley is 42 inches in diameter. There is no countershaft. The engine is belted direct by means of a 5 inch double belt, the driven pulley of the dynamo being 10 inches in diameter. The power absorbed by the dynamo-electric machine is about seven horse.

The arrangement of the main conductors distributing the current to the lamps will be understood from the diagrams (Figs. 1, 2, 3). Fig. 1 represents a plan of the hold of the Fulton. There are two main leads on each side, *A A*, *C C*, which are made of No. 0 (B & S) copper wire and extend nearly the whole length of the boat. These

conductors are properly inclosed at a slight distance from each other in a wooden casing attached to ceiling of the hold. The dynamo is connected with the main leads *A A* as shown in Fig. 1. The current from the main leads *A A* is conveyed to the main leads *C C* by conductors

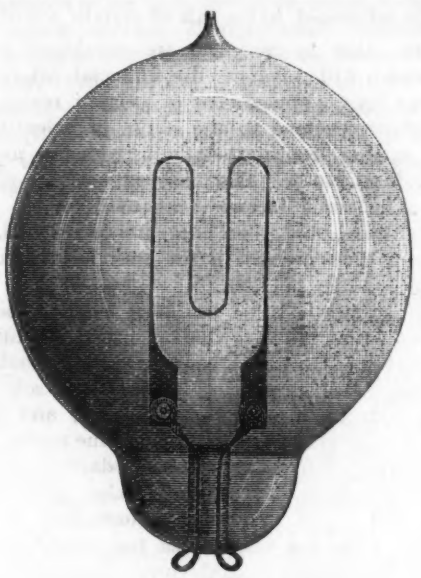

FIG. 7.

of the same size *B B*, crossing at about the central part of the boat. At the point of connection between the leads *A A* and the crossing conductors *B B*, a switch *S* is included in the circuit and also a safety cut-out (Fig. 5). The latter device is extremely simple and is intended to act so as to open the circuit automatically, if from any cause or for any reason the amount of the current passing in the circuit should exceed a certain value. Fig. 6 shows the cut-out with its cover removed. It consists of a thin strip of an alloy of metal fusible at low temperature held between two brass clamping devices to which the wires are attached, so that the fusible strip completes the circuit. The alloy will fuse at the extremely low temperature of 160° F. Now, when the current passing in that part of the circuit exceeds the proper quantity, as would happen if from accident a short circuit were produced at any lamps supplied by it, the conductor is likely to become heated. But the heat will not exceed 160 degrees, for the strip will fuse and the circuit will become opened at that point. As a matter of fact, the strip will fuse much sooner the copper conductor reaches that temperature, because the area of section of the strip in each case is made only sufficient to enable it to carry its normal quantity of current without heating. The instant that this amount is exceeded it heats and is liable to fuse.

The heat of the molten alloy can be borne by the hand without discomfort, and consequently it is not likely to set fire to any object with which it might come in contact. It is precisely for the purpose of securing complete safety from fire that this low standard of temperature was adopted for the Weston fusible strip. It might happen, sometimes,

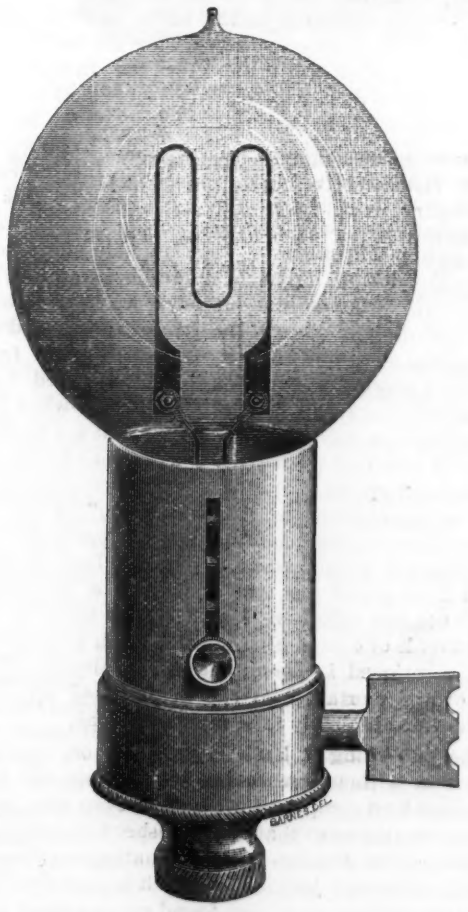

FIG. 8.

that some of the fused alloy would come in contact with woodwork, and there would be danger of fire from this circumstance if its temperature were high enough to ignite the wood.

There are ten of the lamps situated in the hold, as represented by the small circles in Fig. 1 (1, 2, 3, 4, 5, etc.). Of these, two are situated at the head of the boiler (1, 2), one on each side (3, 10), one over the stairway to the main deck (5), and one near the engine of the dynamo (4), and the remaining four (6, 7, 8, 9) placed near the driving engine at various points convenient to the engineer. The lamps are of the well-known Maxim type.

Fig. 7 shows the lamp, and Fig. 8 shows the holder which is used with it. The small disc on the bottom of the holder is normally held down by the spiral spring shown in the sectional view, but there are provided two pins projecting from this disc and passing through slits at opposite sides of the holder to small buttons, by means of which the disc may be moved upward to near the opening of the holder, and then the hooked ends of the two conductors, which project from this disc, may be easily inserted into the looped terminals of the lamp, which are adapted to this purpose. This is a most ingenious contrivance, not only because it facilitates the mounting of the lamp on its holder, but inasmuch as the spring tends to pull down the lamp as far as it can, it provides for a good and reliable electrical contact between the conductors and the terminals of the lamp. Each lamp is provided with a fixture of simple but neat design, which bears an inverted opal glass shade of a tint to render the beautiful light yet more pleasing to the eye. These lamps are wired directly from the mains by means of independent loops. No. 19 copper wire is used for the purpose. At the point where the loop connects with the mains is inserted a fusible strip (*f*) and at the lamp end of the loop, near the lamp itself, another fusible strip (*f*) is also inserted. These strips are made of the same alloy as the others just described, but are smaller. They are also contained in a smaller round case (Fig. 10), which is made in a neat design.

The conductors leading from the main to go to

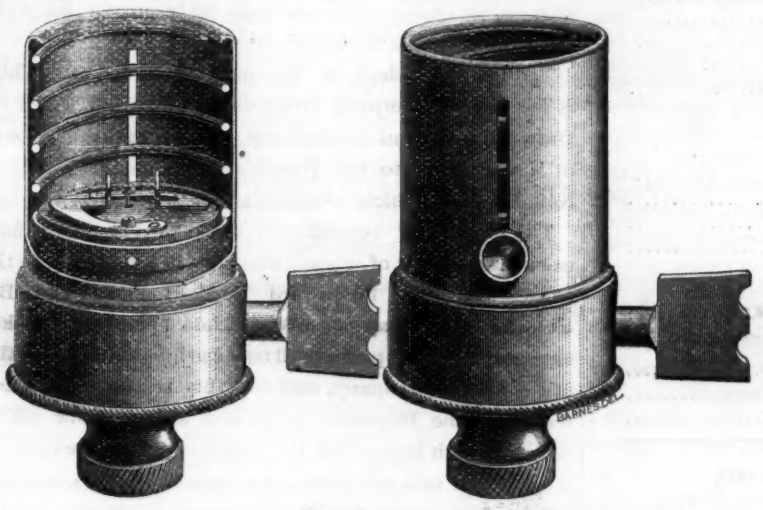

FIG. 9.

FIG. 10.

the chandeliers on the main deck (Fig. 2) pass through the floor and partitions at the points indicated in Fig. 1. There are also smaller mains starting from the mains *AA*, *CC*. These extend upward directly to the pilot-house. On the main deck there are 36 lights. Each cabin has two four-light chandeliers at each end, making 16 lights per cabin. The conductors leading from the mains to the chandeliers are of No. 14 copper wire, each chandelier being itself a multiple loop from the main conductors, because its four lights are connected in multiple circuit. Each chandelier loop has a fusible cut-out *f* at the point of connection with the mains (shown in Fig. 2 by the heavy dotted lines) and another fusible cut-out near the chandelier (*F*). There are two lights in the midship lantern at each end of the boat. These are in a loop also from the mains, and are likewise provided with fusible cut-outs. Only one of these lamps in each lantern is used at a time, however, the second being placed there so as to be in readiness in case of accident to the first. A common two-way switch is provided for the convenience of the deck hands, who can thus turn on the fresh lamp should they discover the rupture or failure of the other. There is a loop from the mains which goes up to each pilot-house, as just stated. Each pilot-house contains seven lights. The loop is wired with No. 12 wire, and has a large safety cut-out at the junction with the main and also a switch to open and close circuit. From this loop there are smaller loops which supply the lamps. Fig. 3 is a plan of a portion of the upper deck, and shows one of the pilot-houses. There are two lamps on each side, provided with a cut-out and likewise with a two-way switch in the same way as the lantern amidship. There are two lamps on top of the pilot-house, which are similarly arranged. The switches are all placed in the pilot-house at the convenience of the pilot, who is thus enabled to transfer the current from one lamp to the other at will. Besides these, there is a lamp at one side of the magnetic compass. The signal lantern placed on the top of a mast at one end is wired directly from the mains. It contains two lamps, and is provided with a two-way switch, like those just mentioned. The conductor, leading up to the top of the mast, is made of copper cable, so as to be flexible and to permit the raising or lowering of the lamp.

The plant we have described was put in operation for the first time last Monday, and has continued in use so far without trouble or interruption. The lights are used all night, from dark to dawn. Each lamp is of twenty candle power, and the effect in the cabins is magnificent, rendering the contrast of the Fulton with its sister ferry-boats at night very striking. Gas lights are always at a disadvantage on ferry-boats, because of the drafts and air currents which constantly disturb them. The electric lights are entirely free from disturbance, and this makes their mellow radiance all the more agreeable. It is probable that the Union Ferry Company will also introduce this innovation on its other boats soon. The installation was under the immediate charge of the United States Illuminating Company, which is subsidiary to the United States Company, and has control of the territory of New York and vicinity. The work was supervised by the Electrian of the United States Illuminating Company, Mr. H. Vanatta, and reflects credit on his ability. As already stated, other installations of the Maxim-Weston incandescent system have been in operation for over a year on some of the North River ferries, with perfect results. The adaptation of the electric light on ferry boats may, therefore, be regarded as having passed the experimental stage. The Fulton makes the tenth ferry boat in New York harbor provided with the Maxim-Weston electric lighting apparatus. Of the remaining nine, seven are the boats of the Jersey City ferry, which are operated by the Pennsylvania Railroad. The two ferry boats recently placed on the North River by the New York, West Shore and Buffalo Railroad are also lighted by the same system. The plants on these ferries are similar to that of the Fulton, and the installations were also made by the United States Illuminating Company.

The Providence Clam Bake.

Mr. Eugene F. Phillips, President of the American Electrical Works, Providence, R. I., has issued the invitations to his fifth annual social gathering of electrical people to partake of a Rhode Island clam dinner, on Saturday, Aug. 18th, 1883, at the Vue de l'Eau Club at Silver Spring. Boats are to leave Providence for Silver Spring at 10, 11 and 12 o'clock, and lunch is to be served at 12:30, the bake being announced for 3 o'clock. Those who have attended any of the clam bakes given by Mr. Phillips will, we know, make vigorous efforts to be present at this one. To those who have not, we can only say that they can form but little idea of the pleasant time the participants always have. The committee of arrangements is about the same this year as last, namely: H. W. Lytle, now of Baltimore; J. W. Duxbury and W. H. Sawyer, Providence; John I. Sabine, San Francisco; R. K. Pearce, Philadelphia, and H. W. Pope, New York.

The Gramme Patent in Court.

In the United States Supreme Court, at Newport, R. I., Judge Blatchford presiding, argument was begun August 9, in the case of the Gramme Electrical Company, of New York, against the Arnoux & Hochhausen Electrical Company. This is a suit for infringement of a patent granted to Zénobe Théophile Gramme, of Belgium, in 1871, he being the inventor of the modern dynamo machine. The complainants allege a general infringement. The case involves very occult scientific questions, and has been in controversy among electricians for many years.

English Views on the Strike.

The *Electrical Review* and the *Electrician*, of London, devote leading editorials and considerable space in their issue of July 28 to the strike among the American operators. The *Electrician*, which has more than two pages on the subject, says that there appears to prevail between Mr. Gould and the late employés of the Western Union "pretty much the same sort of sympathy and goodwill as may be supposed to exist between the captain of a slave ship and the niggers down in the hold."

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THE TELEPHONE SITUATION.

The symptoms of greater complications in the telephone case, which we foreshadowed in our issue of July 28, are becoming more marked. As we then anticipated, the decision lately rendered by the examiner of interferences turns out to have been nothing more than a prelude to the grand controversy which is at hand between the several claimants to the priority of invention of the telephone. There is a gathering of the clans on all sides, which tells plainly that there is mischief ahead. We may look for another onset at an early date, either in the Patent Office or in the courts, and the clash between the contending interests promises to be loud and vigorous, for the reason that all the parties to the controversy feel the bone of contention to be well worth the effort necessary to secure it.

The telephone business of the country is, in fact, a large and prosperous one. It represents already over $100,000,000 in the aggregate capitalization of the several companies doing business under concessions from the American Bell Telephone Company. This is more than the amount of the capital of the Western Union Telegraph Company, but the telephone as an enterprise is destined to go entirely beyond this point at its present rapid rate of growth. The instruments in use throughout the country increase by several thousand each month, and such will continue to be the case for a long time, until the telephone has become generally adopted in most small cities and towns. When this has been accomplished the business will doubtless earn enough to pay dividends on a capitalization at least double the present one.

The monopoly of the business is, of course, in the hands of the Bell Company. It depends mainly on the patent granted to A. G. Bell, March 17, 1876, which claims broadly the whole art of telephonic transmission. This is the fundamental patent on the telephone, since it practically excludes all competitors from the field. This celebrated patent was involved in the interferences lately described, and the examiner reaffirmed the claims of Bell. In this patent the Bell Company has virtually the mastery of the situation. But the question arises whether it will long remain in possession of these claims.

The immediate future will doubtless witness a series of suits in which these claims will be called in question by some of Bell's rivals, probably McDonough and Drawbaugh, and possibly Gray. It is in the courts that the most interesting developments are to be seen, and it is from them that the most important decisions are to be expected. It would be absurd to speculate on the ultimate result of all this litigation by an attempt to predict the nature or scope of a decision which will involve so many facts, of which some are probably as yet unknown. Before the final result is reached we shall probably have to chronicle many additional developments, for in all probability suits will be met by counter suits, decisions by appeals and a general trial of legal tact will take place. For our part we believe that a long time will elapse before the telephone question, as we might call it, will have arrived at a definite and final settlement. The end is certainly not yet, for in truth we have scarcely seen the beginning. Indeed we wonder whether, out of all this complication, a final decision will come soon enough to be of much use to anybody. The interferences lately brought to a decision had been lingering in the Patent Office, most of them for seven years. We can infer readily that a long delay will also be met with in the courts before the suits are decided. The friends of Mr. Drawbaugh have of late expressed their confidence in the most sanguine manner. They feel so sure, in fact, that the results of the suits pending will be in their favor, that they propose to organize subsidiary companies at once, with a view to duplicating the telephone exchanges in every city, and thus be prepared for doing business when the decisions are rendered.

The People's Telephone Company of New York, which is the parent company controlling the rights under the Drawbaugh system of telephony, has just sold the territory of New England to the People's Telephone Company of New England, which is capitalized at $5,000,000.

The newspaper accounts of these developments have caused somewhat of a sensation, and it is probably to this cause that the downward oscillation of the Bell Company stock may be traced. The value of the stock of the subsidiary companies will necessarily oscillate with that of the present company, and for this reason the developments of the litigation in process and to come will be watched with interest by the public of the whole country. As we have said previously, we do not anticipate any serious reaction, because we do not foresee any trouble for the Bell Company in the immediate future.

It may interest our readers to remember in this connection that the Western Union is interested to a certain extent in the fate of the Bell Company, because this fact may serve to throw a new light on the possible developments of the future. There is a contract, or rather a compromise, between these two companies, under the terms of which the control of certain telephone inventions owned by the Western Union is transferred to the Bell Company, in consideration of which it is guaranteed the first twenty per cent. of the Bell Company's net earnings, and also exemption during the life of the telephone patents from competition between the telephone and telegraph service, as well as a further guarantee that the telephone company shall never use their poles or wires for a telegraph business.

This compromise practically forms a bond of friendship and sympathy between the two companies. If ultimately the tables should turn against the Bell Company, the prospect of losing such a snug income would naturally suffice to make the Western Union sympathize with its sister monopolist, the Bell Company, and we can safely predict that it could be relied upon as a strong ally to the latter. Such an alliance, it is needless to say, would tend to weaken the efforts of the coalition of the rivals besieging the stronghold of the Bell Company.

The mere possibility of such an alliance is another proof of the complication and uncertainty which envelop the telephone question. A close analysis of every detail, moreover, will disclose many other important revelations elsewhere. The various contestants all have their reserves in readiness, also, so as to strike their opponents vigorous and, if possible, fatal blows. But it appears to us that the more effort each one makes to be successful, the longer will the tournament last; and that is why we predict that the telephone situation is not likely to change materially, for a few years at least.

Dishonest Journalism.

There are scientific papers, so-called, which are merely advertisment sheets, more or less effectively disguised. They are of two classes, the one published by persons directly interested in the sale of certain scientific devices, and the other by men who are subsidized to print that only which will advance the financial interests of those who pay for the appearance of certain matter. Both of these classes pretend to the name of scientific journals. Their success lies in their being able to maintain this assumed character. The cleverness of the disguise they wear is in some instances unquestionable; their title is pretentious, and their contents correspond, in the appearance they present to the unsophisticated, with the pretensions they hold out.

Such journals as these, however, even the best of them, obviously must fall very short of being scientific periodicals worthy of the name, because they are not printed for the purpose of presenting information selected for its value, exclusive of other considerations, and for the purpose of conveying instruction to the reader. Scientific papers which fall short of this standard have properly no right to the name, because they either give undue prominence and "puff" to what is unworthy, or undervalue or omit what the reader has the right to find in them. When what is really valuable comes under the observation of their management, instead of dealing with it as it deserves, the policy is to cast about in order to discover some way of making money from parties interested in its publication, and failing in this, good matter is rejected. Commercial organs of this sort are certainly weak, because silent or "on the fence" concerning subjects ripe for treatment.

Perhaps a more common expression of the abuse of journalistic integrity than that already referred to is the unjust manner with which some periodicals are in the habit of treating both their contemporaries and their readers, if they have any—we mean in the matter of using what other journals have worked for, or paid for, without giving credit. They will—not occasionally, but regularly, issue after issue—steal bodily important articles, or series of articles, written by prominent authors for foreign periodicals, relying on the fact that, there being no international copyright, they cannot be held to a proper accountability for the theft; and arguing that the foreign paper probably has but little circulation in this country, they will print the stolen matter in a prominent position, and append the author's name in such a manner as to give the impression that the articles were written especially for their columns.

While on this subject we quote with appreciation the terse remarks of the London *Electrician*, in its issue of July 28. Referring to the "appropriating" by a paper which it names of articles written for an English periodical, without giving any credit to the original source, the *Electrician* says: "Our American friend may see a difference, which we fail to see, between stealing literary matter and stealing one's coat." The London *Electrical Review* not long since treated the same American periodical, also by name, to a little bitter, biting sarcasm on the same subject. No defence or explanation appeared in the latter, however, and the remarks of the *Electrician* may in like manner be allowed to go unheeded, on the ground that the circulation of these foreign journals in America being somewhat limited, comparatively few will have read the accusation; and a person capable of this species of theft may not be able to see how a public discussion of the matter can interest either him or his readers, if he have any. We mention this particular instance to show our English contemporaries that we sympathize with them in their laudable efforts looking to a purification of electrical scientific journalism; and we hope their criticisms and our reference to them here may have the desired effect in the quarter they aimed at.

The warm commendation of more or less fraudulent goods or unworthy inventions by the so-called "trade" or "scientific" journals of pretentious title—when they take no pains to investigate their merits, but are merely either paid for inserting the articles or a certain number of copies of those issues are ordered at a high price—is even more to be deprecated than the "appropriating" of articles from other papers. Such indorsement by apparently responsible journals is misleading, to say the least, to those who have not learned the true character of the periodicals. Business men who have found out the tricks of this class of journals of course give a wide berth to anything they find mentioned in them; but there is always a large crop of unwary mortals who can be imposed upon through such often absolutely false representations.

The publishing of laudatory articles on inventions or otherwise without a searching inquiry into the merits of the same by a competent person—or even the publishing of an advertisement that the publisher has reason to know is more or less fraudulent in its nature—is beneath the dignity of honest journalism, and it is well that the character of such papers is soon found out and their power for further mischief prevented. While publishers have a right to make money out of their papers in a legitimate way, through subscriptions and through honest advertising in the regular advertising columns, it is more than shameful that the so-called scientific journalist's opportunities of communicating valuable news, discovery and the practical

application of discovery should be wasted by merely mercenary considerations on his part. He is virtually a slave, and in his relations toward the public a deceiver.

Happily for the general good, the career of such prostituted periodicals as we have described is apt to be brief as well as inglorious, and after a time uninfluential. Readers are quick to discern deceit of this kind, and the inevitable results follow sooner or later. We could refer, did we choose to do so, to papers once eminent for their completeness and fairness toward the public which, having sold themselves for gold, are obliged to be content with the ignominy attached to slavery.

The Long Strike.

The great strike of the commercial telegraphers was strengthened on Monday and Tuesday last by a strike of railroad operators. On Monday, the 5th inst., and Tuesday, the 6th, a large number of the operators on various railways went out. Mr. A. J. Morris, the Master Workman of the Brotherhood in Chicago, telegraphed as follows on Tuesday: "A majority of the Chicago & Alton and Wabash Railroad operators are out. The remainder will follow when notified." On the same evening Mr. Campbell stated that he had received information that all of the telegraph operators on the Pittsburgh Division and the Wheeling Division of the Baltimore & Ohio Railroad had left their keys; also that most of the telegraphers employed by the Shenandoah Valley and Chesapeake & Ohio Railroads had quit work. Not only had the operators on those roads struck, but it was stated that a majority of the locomotive engineers had also refused to work while the operators were off duty. Mr. Campbell did not state from whom his information came. It was reported that all of the operators at the Camden station, on the Baltimore & Ohio Road, left their desks in a body.

The railroad operators all presented bills of grievance before inaugurating the strike. They demand an increase of $10 per month on every salary, that no salary be less than $50 per month, that extra pay be allowed for Sunday work, and that all railroad telegraphers discharged for refusing to handle Western Union business be re-instated.

The railroad strikes will, of course, do much to strengthen the commercial strikers, and with further developments yet to be revealed, the situation still appears to be that the telegraph companies must very soon yield the point at issue or close their doors, since they cannot carry on business with the present jaded and incompetent force. Their circuits continue to be piled up every day, and business that is worked off by telegraph is badly mutilated, while hundreds of messages, it is said, are sent by mail every evening.

The strikers maintain a surprising unanimity, and enter the fourth week of the strike stronger and more sanguine and with better prospects than at any time since July 19. Meanwhile the opening of the fall trade is near at hand, with its customary rush of business, and the Western Union authorities are making wild efforts to create a break. These attacks, backed by money and promises of promotion, and sometimes by dark threats of vengeance, seem to be concentrated at one place at a time. The pressure has been applied mercilessly at New York, Philadelphia, Washington and other places, and just now it is being brought to bear on Pittsburgh, though the efforts will be more hopeless there, if possible, than at any other place.

The strikers still retain the confidence of the merchants and brokers, the public generally, and the unsubsidized press, and money for the cause flows in liberally.

On the 2d inst. the strike had spread across the frontier into Mexico, where the operators on the Mexican National Railroad went out, demanding an increase of $30 per month. Railway traffic was interrupted in consequence. The strikers are all Americans except one, who is a Mexican.

On Saturday last a monster meeting of workingmen, called to meet in Fairmount Park, Philadelphia, on the following day (Sunday), to express sympathy with the striking operators, was prohibited by the authorities of that city.

New companies now being formed are receiving liberal support. In this city, on the 2d inst., the Exchange Telegraph Co. was incorporated with a capital of $2,000,000, with the privilege of increasing it. The lines are to extend from the Atlantic to the Pacific. The Postal Telegraph was formally opened on the 6th inst., with a through line to Chicago and connection with the American Rapid. The directors of the Postal seem also to have "struck" against Jay Gould, since the latter's puppets in the Postal directory have been asked to resign.

It was stated by the officials of the Western Union on Tuesday, the 7th, that 59 wires in the vicinity of New York had been cut some time during Monday night. The cable box at the Cos Cob drawbridge was destroyed, they declared, and the cables were cut. All of the direct wires between New York and Boston were said to have been cut or otherwise interfered with. The company was obliged to send its Boston business by way of Albany on Monday night. Several of the Mutual Union wires at Scarsdale, which are now controlled by the Western Union, were also said to have been cut. Linemen in the service of the Western Union Company were sent there to repair the damage early Tuesday morning, and they reported that he work had been done by skillful hands. The Western Union has offered a reward of $1,000 "for the arrest and conviction of each and every person willfully displacing destroying or injuring any part of this company's telegraph wires or appurtenances."

The officers of the Western Union also claim that 82 of their wires had been cut or otherwise tampered with on Tuesday night, and that in some instances the cross-arms were sawed off. They report, however, that no cutting occurred on Wednesday night, and that all the damage had been repaired and everything was O. K. again on Thursday morning.

When the attention of Messrs. Campbell, O'Connor and Mitchell was called to the allegations of the Western Union people, the three Brotherhood men said that they would gladly join with the Western Union Company in securing the punishment of any Brotherhood or Western Union linemen who were found guilty of tampering with the wires. After considering the matter at their evening meeting the Executive Committee resolved to offer a reward of $1,000 for the arrest and conviction of any linemen guilty of cutting or destroying telegraph wires. Master Workman Mitchell said that a reward would also be paid for the arrest and conviction of any person who tried to bribe any lineman to destroy any of the wires belonging to any telegraph company.

A "contumist" operator living in Brooklyn claims to have been attacked and beaten on his way home from the Western Union office just before midnight on Monday last. Although he could not recognize his assailants, the Western Union is trying to make capital out of the affair, and has offered a reward of $1,000 for the arrest and conviction of the perpetrators of the assault.

The story of the cutting of the wires is looked upon by many as a device of the enemy to alienate public opinion from the strikers. Referring to the matter the *Times* of this city says editorially:

"These reports of wires cut and 'cable boxes' destroyed have a suspicious look. Some irresponsible persons among the strikers may have done the damaged complained of, but nobody will believe that the wires were cut—if any have been cut—by persons acting under instructions from the officers of the Brotherhood. Many people will prefer to believe that the work was done under secret orders from the office of the Western Union Telegraph Company to discredit the strikers and keep up the deception as to the actual capacity of the company to do business with its present force. Such tactics would be despicable, of course, but so are stock watering and lying. And the public really knows very little about the wretched condition of affairs in all the large telegraph offices. In Washington the company has found it necessary to supplement the work of its local Munchausens by means of extracts from its organs published as advertisements in the newspapers of the capital."

The way the members of the Brotherhood argue is this: "Admitting that the wires were cut, it would have been impossible for the company, with its present number of linemen, to have repaired them so soon. Hence, the statement that it has done so must be untrue. On the other hand, if the wires are working all right, they were not cut, as reported." They are rather inclined to believe that there is, at least, great exaggeration as to the number of wires cut, for effect and as an excuse for the slow service.

The Executive Committee of the Western Union met at noon on Wednesday, the members present being Messrs Gould, Sr. and Jr., Sage, Field, Eckert, Dillon, Terry and Durkee. Only routine business was transacted, the strike not being considered at all. It is expected that President Norvin Green will sail from London for this port on August 11.

The United States Senate Committee on Labor and Education met in this city last Monday and adjourned till Monday, the 18th instant. They intended to begin an investigation into the present telegraph strike, but the witnesses, among whom were John Campbell, John Mitchell, Eugene O'Connor and other leaders of the strike could not attend, owing to the additional duties devolving upon them in consequence of the ordering out of the railroad operators, and the postponement was requested on this account.

The Postal Telegraph Question.

The present considerable feeling in favor of a postal telegraph under the control of the Federal government is but the repetition, or rather the continuation, of a movement no longer young. So far back as 1869, Representative C. C. Washburn, of Wisconsin, submitted a bill before Congress, which proposed that the Federal government should buy existing lines and attach the telegraph to the postal system of the United States. An act passed three years before authorized the government to purchase existing lines at a price to be fixed by arbitration. Mr. Washburn's proposal was approved by the Postmaster-General, and by President Grant. The Hubbard scheme, placed before the public at a somewhat later date, proposed the incorporation of a private company, to act under special contracts with the government. Both of the above schemes were opposed by the Western Union company, and by many persons who were less interested in their opposition than it. The excitement of the conflict died away about three years from its inception, and no action was taken in the premises.

A contemporary suggests that the establishment of the postal telegraph would add immensely to the patronage at the bestowal of the party controlling the government. A postal telegraph could only be attained by the purchase of telegraph property whose valuation has been greatly inflated above its actual worth. The government could build telegraph lines more cheaply than it could buy the lines already constructed, but it is no part of the business or policy of the government to injure the property of individuals by becoming their competitors for the patronage of the public. Should the government erect lines, as it is with the mails it must be with the postal telegraph, to be successful the government should control the entire telegraphic system of the country. It is urged further that the establishment of the postal telegraph system would increase taxation.

On the other hand, it is maintained that the telegraph service of the country is now virtually a monopoly, and that the protection of public interests requires the establishment of the postal telegraph to guard the people against excessive charges and against the inconveniences of strife between employers and employed; that the telegraph comes under that provision of the Constitution giving the Federal government the power to regulate commerce; that its control by the Federal authorities would involve no interference with private rights, seeing that by the law of 1866, referred to above, the government is authorized to purchase existing lines at a price to be fixed by arbitration.

As we have before found occasion to say, the true remedy for those abuses of the telegraphic service which become abnormally prominent at times like the present, is rather to be found in wholesome business competition than in its transfer from private corporations to the Federal authorities. If, as we find reason to hope, there should grow out of the great conflict now exciting the whole population of the United States, new and competing interests, the result would be cheaper and better service. The public would certainly patronize those companies giving them the best service for the least money. Nor is there sufficient reason to believe that the disappointments of the past, in the matter of the consolidation of new companies with the Western Union, will necessarily be repeated. If proper advantage be taken of the animus against that gigantic corporation which is now unquestionably general, business men and the striking operators will combine and establish competition with that company which will be of such a nature as to preclude the possibility of its being bought up. There is a limit even to the devouring capacity of the Western Union.

Provided that the desired competition should be accomplished, cheapness and completness of service would result in the more extensive use of the telegraph. The incomes of the companies providing its facilities would be largely augmented, and the interests of skilled operators would be advanced by the competition for their services. While we respect the views of those who advocate the establishment of the postal telegraph, we submit that the more statesmanlike plan is the encouragement of that individual action on the part of citizens which is one of the chief and most honorable peculiarities of American business life, by the establishment of a company, or better still, of companies, to share with the Western Union the duty of providing telegraphic communication for the people.

THERE is a crazy railroad superintendent in Pennsylvania who publicly announces that in case of a strike on his road he would run trains by *telephone*. Such an idiot is a common foe to humanity, and should a strike occur there, and he try his telephonic experiment, there will be a dozen collisions on the first day, and he will go to the penitentiary for manslaughter. Whatever expedient may be adopted for running trains, the telephone in the hands of brakemen should be prohibited.

THE famous newspaper correspondent, Joe Howard, who is generally a keen judge of men and things, writes: "Jay Gould will be beaten in the strike, but his yacht is a consolation." Jay Gould may be beaten in the strike, but we have some doubts about the consolation in his yacht. This Atalanta may find her Hippomenes. The day she was launched at Philadelphia she ran afoul of the monitor "Terror," and the Gould flag which she flies—a big G on a yellow ground—makes all the foreign skippers mistake her for a floating small-pox hospital. There is not a plate in her sides, not a rivet in a plate, not a sail nor a rope, not a yard of bunting but what is dripping with the tears of the unfortunate. The Atalanta is thoroughly watered and may prove top-heavy.

WHEN the Western Union undertook to board and lodge its "loyal" men, it certainly did not properly estimate the greed and voracity and avarice of that motley gang. As a specimen case we may mention one man in a large town who sleeps in the company's building, and is, by the record, on duty every waking hour. When the free board scheme was first announced this enterprising person promptly discharged his hired girl and shipped his wife and children to the country, where they can board for nothing with relatives, while he himself moved into the Western Union building. He thus saves at one swoop bills for rent, food, fuel, gas and servants' hire, his only expense being for what laundry work he needs. This man is also a notorious shirk, and if he does any telegraphing at all it is because he is driven to it. Can this be the same Western Union that effected a "slight saving" on every change in its beggarly pay-roll? It has now reduced charity to a fine art.

The Claims of Daniel Drawbaugh to the Invention of the Telephone.

A brief allusion is found in the newspapers now and then of Mr. Daniel Drawbaugh, of Eberly's Mills, Cumberland County, Pennsylvania. Mr. Drawbaugh is one of the claimants to the priority of invention of the telephone, and his rights are controlled by the People's Telephone Company of New York. Nothing very definite has been known to the public about Mr. Drawbaugh and his telephonic experiments, beyond the statement that he invented and operated a speaking telephone in the year 1860, nearly eight years before Bell applied for his patent; and that he was too poor at the time to patent his invention, but has been experimenting with his apparatus, with a view to improving it, ever since. The People's Telephone Company has prepared a brief statement of the grounds on which Mr. Drawbaugh advances his claim. This statement, which we here reproduce in full, will be of value to those interested in the history of the telephone:

"For a period prior to the year 1867, Mr. Drawbaugh had given particular study and attention to electrical matters. He had devised an electric clock, various forms of telegraphs, and had devoted no inconsiderable amount of time and labor to considering possible solutions of the problem of transmitting sound by electricity, and had constructed his first crude telephone instruments. In the above-mentioned year the result of his investigations took practical shape in two instruments, which yielded better results than any of the apparatus of like nature which he had previously constructed. Neither of the contrivances was capable in the form in which he produced them, of accomplishing all that the best types of telephones can now do. But they transmitted and reproduced speech. Words and occasional sentences could be clearly understood and recognized through them, and they operated by virtue of an unbroken and constant current of electricity.

"The transmitter and receiver were as unlike both in construction and principle as are the transmitter of the so-called Blake form and the Bell receiver now in common use throughout the country. The transmitter operated by the greater or less degree of compression of carbon powder by a plate actuated by the diaphragm. It was, therefore, a 'resistance' telephone, or a carbon microphone. The receiver contained a case or tube, a membrane diaphragm, a metallic armature secured to that diaphragm and an electric magnet influencing the armature; every element described in Bell's patent of March 7, 1876, operating exactly the same way, and producing exactly the same result as Bell's instrument, shown in that patent, can be made to produce. These identical instruments are in existence, though not in complete form.

"Duplicate apparatus exactly conforming to their dimensions in every particular has been constructed with the lost parts supplied. These reproduced instruments have been subjected to the most rigid tests by the expert of the company, and under the scrutiny of a board of experts, summoned by the Bell company, and the results have demonstrated beyond any question, the capacity of these instruments to transmit and reproduce articulate speech.

"From the year 1867 up to the present time, Mr. Drawbaugh has devoted himself constantly to experiment and study upon the telephone. Between that year and May, 1875, he invented; constructed and practically operated the following apparatus:

"1. A pair of transmitting and receiving magneto-telephones, containing a metal diaphragm and an electric magnet having a core permanently magnetized by contact with a permanent magnet. These instruments worked without a battery, and are substantially the same as those subsequently produced by Bell in 1877. The identical instruments exist in part. Duplicates have been made with the absent portions supplied, and have been tested under the above mentioned conditions, and have transmitted and reproduced speech.

"2. An instrument of small and portable form, entirely inclosed in a flat elliptical case, containing a diaphragm of thin wood supporting a metal armature, an electro-magnet and a mouthpiece. This identical instrument is in existence in complete and perfectly operative form. It has been placed upon a telephone line and tested, as above, and has proved an excellent receiver, for which use it was particularly constructed in 1873 or early in 1874.

"3. Two transmitting and receiving instruments in small and compact form, less in dimensions than the Bell receiver in common use. These contain every element existing in the best modern magneto telephones; the metal diaphragm of thin iron, the electro-magnet, the small case and peculiarly arranged mouthpiece, and the permanent magnet in contact with the core. Both identical instruments are in existence in excellent working condition. They require no battery, and have been worked under test conditions at opposite ends of a telephone line, transmitting and receiving speech, in every particular, exactly as well as the best forms of modern magneto-telephones. In fact, receiving instruments could be made on precisely the same model, without changing in the smallest particular any part or portion, and enter into public use with the same degree of success as any receiver now employed.

"All of these instruments were invented, made and practically operated before May, 1875."

Mr. Drawbaugh was not included in the interferences on which decisions have been lately rendered, because his case was filed at the Patent Office after the interference had been declared and testimony had been taken.

He is now in interference, however, on the transmitter, and additional interferences will probably be declared on the receiver and other features, if the evidence sustain his claims. Meanwhile the People's Telephone Company has been sued for infringement. There is a suit now pending between the American Bell Company and the People's Company in the United States Circuit Court of the Southern District of New York, which was brought by the Bell Company to obtain an injunction and damages against the People's Company for an alleged infringement by the latter of Bell's patent of March 7, 1876, the infringement consisting in the alleged use of a telephone constructed in accordance with a patent of a later date than Bell's, which had been acquired by the People's Company.

The statement above referred to contains the following abstract of its answer to the bill of complaint:

"The People's Company deny that Bell is the first and original inventor of the art and means of telephony, and assert that consequently his patent is void, and that the true first and original inventor is Daniel Drawbaugh. In proof of this all the instruments named above have been produced, filed in the United States Court as exhibits, and upward of a hundred witnesses have testified in support of Mr. Drawbaugh's statements as to the dates when he invented, constructed and used them. These witnesses in many instances positively identify the instruments and fix the dates when they saw them and heard them transmit and reproduce speech, in many cases repeating the very words and sentences which they heard through the apparatus. The Bell Company has had ample opportunity to meet this overwhelming testimony, has taken over a year to produce rebuttal testimony, and has wholly failed to overcome it or to break or diminish its force.

"It needs no detailed demonstration to show the necessary effect of the facts advanced and substantiated by Drawbaugh upon the determination of the telephone controversy. It has been shown that if he out-dates May, 1875, he takes priority of every other alleged inventor. He meets this demand by anticipating this earliest fixed date by more than eight years, with his practical working instruments; by constantly decreasing periods with instruments containing more improvements and nearer approaching perfection in operation; and finally by about one year with instruments containing everything that the best modern magneto instruments contain, and fully the equals of them. He relies upon no scrap books of sketches and scrawls that may have any and all sorts of *ex post facto* interpretations to which the ingenuity of the inventor or expert may put them; he submits no hazy recollections of interested relatives and personal friends, who mistake what the family genius thinks he might have done, for what he actually did; he does not rake over a laboratory scrap heap to fish out unrelated parts, ingeniously unite them and assert that they worked in this or that way; he does not bring out some incomprehensible contrivance, and claim that if he had this, that or the other, it would have done this thing or that; he does not ask the people of this country to believe that he made the invention, and put it aside for several years, and did nothing about it, and picked it up again and completed it, this without rhyme or reason; but, on the contrary, he submits his claim to the courts and to the public substantiated by the instruments themselves, that he made and used and successfully operated. And these instruments he freely offers to the inspection of the best electrical experts in the United States, and leaves them free to test them as they please, knowing that the result can be no other than the complete demonstration that they are speaking telephones. By the testimony of scores of unimpeached witnesses, well known in their communities, who identify these instruments, who positively aver that they saw them and heard them talk, and who remain unshaken and clear in their statements under the skillful and searching cross-examination of the opposing counsel; and, finally, by the facts that he has always continued vigorously and energetically, and still continues to labor upon and improve the telephone; that at no time has he ceased this work; and he now produces and exhibits instruments made subsequent to 1875 and before 1877, containing improvements and refinements of construction and detail, rendering them as highly specialized as any apparatus of like character constructed within the last three years."

A certificate of the incorporation of the Drawbaugh Telephone and Telegraph Company was recently filed in the office of the county clerk, this city, the capital being stated at $15,000,000, in 300,000 shares of $50 each. It is authorized to do business throughout the United States, and the following gentlemen are named as incorporators: William Enos Walkley, Elbert Palmer Fisher, Charles Duryea Beach and Herbert Valentine.

The Postal Telegraph Company.

The wires of the company were opened for business on Monday last between New York and Chicago and the intermediate points reached by the company's lines. The rate is to be a uniform one of twenty-five cents for twenty words between all points. This schedule was decided upon some time ago, but at a meeting of the Board of Directors held recently Mr. Hugh J. Jewett suggested that the company make its schedule identical with that of the Western Union. He was supported by Mr. Thomes Dickson, and to some extent by President Joel B. Erhardt. Mr. Jewett's proposition took the other members of the board by surprise. Some of them did not hesitate to accuse Mr. Jewett of acting in the interest of the Western Union, of which he is a director. Other very definite intimations were made, it is said, that Messrs. Jewett, Dickson and Erhardt were all acting in the interest of the Western Union Company. This open rupture has resulted in the resignation of Messrs. Jewett and Dickson, and it is expected that President Erhardt will also resign. All of the resignations will be accepted.

It is understood that all these directors have disposed of their interest in the company within a few days, and that it has been acquired principally by the other directors. When Messrs. Jewett and Dickson went into the board it is said that they gave the impression, or caused it to be understood, that they would turn over to the company the telegraph wires along their respective railroads, the Erie and the Delaware and Hudson Canal Company. Friends of the company say that no steps have been taken in this direction, and also that the course of the two gentlemen has been toward obstructing the progress of the company as a competitor to the Western Union. Mr. Jewett is a co-trustee with President George S. Cox, of the American Exchange National Bank, of a majority of the stock of the company. It is considered likely that he will retire from the office.

At the meeting of the directors in this city on the 8th inst., the resignations of Messrs. Jewett and Dickson were accepted. Their places were filled by the election of George S. Hart, Vice-President of the American Loan and Trust Co., and W. K. Soutter, of the Stock Exchange firm of Soutter & Co. Mr. Jewett also retired from the trusteeship of the majority of the stocks of the company, and H. L. Horton was elected to succeed him. United States Marshal Joel B. Erhardt sent in his resignation as president of the company, but not as a director. His resignation as president was accepted. The office will be filled at the next meeting. The company has made contracts with the Bankers and Merchants', the American Rapid and the Southern telegraph companies for exchange of business.

A Thunder-Storm in Washington and its Effects.

About ten o'clock P. M., on July 28, a thunder-storm raged in Washington, the rain falling in torrents, just as the train in which the President was returning from New York reached the city. The Baltimore & Potomac depot, as the train steamed in, was bright with the electric lights and familiar faces greeted the gaze of the Chief Magistrate as he looked out from the car window. But before he could reach the door all was in darkness outside. There was a rushing to and fro and whispering on the platforms, finally developing into confused shouting from different directions for lights. In the meantime the Presidential party retreated into the car again. Presently torches were procured, and the party, surrounded with railroad officials and headed by Officer Pat Kearney, marched by torchlight through the building, passing into the fatal ladies' waiting-room, en route for the carriages.

It was noticed that the President appeared unnerved and pale, but the latter was probably owing to the weird light of the flambeaux after the cool, steady white blaze of the electric lights. The cause of the sudden extinguishing of the lights was due to a flash of lightning which struck the United States Electric Light Company's central station. But few persons knew of the simultaneousness of the two events, but those who were present at once recalled the part of the John Wilkes Booth plot which was not carried out—the cutting off of the gas supply.

The lightning which caused the exciting scene in the depot flashed over the wires into the electric light engine-room in the Post Building, on Tenth street, and wrecked portions of the machinery, at once extinguishing all electric lights. Wm. Devitt, the superintendent, and Michael Flynn, the engineer, were each somewhat hurt, Mr. Flynn having been thrown off the platform by the shock. The machines for generating electricity were torn up, but no injury was done to the steam engine which drives the electric generators. The loss to the electric light company, will, it is thought, be several thousand dollars.

The Result of an Operator's Carelessness.

An accident occurred August 1 on the Boston and Albany Railroad by which six persons were burned to death and twenty cars entirely consumed. The responsibility for the disaster appears to rest upon the Night Operator Johnson, of Petersburg Junction, who failed to communicate to the day relief the train orders he had received. He pleads sleepiness and overwork. The railroad commissioners will investigate the matter, and ascertain whether employés are forced to work so many hours that their services become inefficient through exhaustion. The trains came together with a terrible crash, and the wreck immediately took fire, while a few cars rolled down the embankment into the Hoosick River. A number of the train hands were buried beneath the wreck, and such as were not instantly killed were roasted to death. The whole blame of the accident is believed to rest upon the night telegraph operator at Petersburg Junction. He had been given orders to hold train No. 1 at his station, and had replied "O. K." These orders were received just

before eight o'clock. Johnson, who is but seventeen years of age, had been on duty all night, and, it is said, was not relieved by Station Master Hoag until nine o'clock. He neglected to notify Mr. Hoag of the instructions he had received to flag and hold the train. Johnson disappeared after the accident, and it was falsely rumored that he had committed suicide. He was discharged by Superintendent Crandell at noon.

The New England Consolidation.

At a meeting of the directors of the companies interested, at Lowell, Aug. 4, resolutions were presented recommending a consolidation of the telephone companies in New England upon a basis substantially as follows: Capital of the consolidated company, $16,000,000; Boston and Northern stock goes in at $150 per share; Bay State at $130; Suburban at $140, and National Bell of Maine, at $90. The American Bell Company will hold $8,000,000 of the consolidated stock, and will waive a dividend for three years, after which $1,000,000 will participate in the dividends. There will be $8,000,000 of new issued stock and $200,000 in the treasury for construction. The Southern New England Company will represent in the consolidation $1,673,000; the Southern Massachusetts Company, $711,000; the Providence Company, $8,000,000, and the Granite State, $121,500. Morris F. Tyler, of Connecticut, was proposed for president, W. A. Ingham for vice president, some Boston man for treasurer, C. J. Gliddon for secretary, L. N. Downs for general manager of the Northern division and H. P. Frost of the Southern division.

Referring to this subject, it is announced that a meeting of the stockholders of the Boston & Northern, Bay State and Suburban companies will be held in Lowell August 10; the National Bell of Maine will meet in Portland August 11, and the Granite State Company will meet in Manchester, N. H., August 13, to take action upon the consolidation of the New England telephone companies. The Southern New England, Southern Massachusetts and the Providence telephone companies also meet during the week, and it is believed the business will be completed by August 15.

Electric Railway in England.

The electric railway at Wimbledon, says the London *Times*, is in operation, and a train with Earl Brownlow, Sir Henry Halford, and 18 other members of the association, ran the length of the line, about a mile, at a speed (six miles an hour) which earned for the engineer the congratulations of the party. The experiment has been, unfortunately, a rough one, and the conditions under which it has been carried out are very detrimental to the reputation which the system is susceptible of attaining. The familiar track of light rails laid down 22 years ago, with carriages of the same date, the sleepers loose in the sandy soil, is not the kind of line for an electricty-driven train to be shown off upon, especially when the wheels of the cars are so much furrowed that their bearing surfaces bump on every chair of the rails they pass over. The system of propulsion is by current generated from a Weston dynamo worked by a 12 horse-power Robey engine, and conveyed and returned by two flat copper bands about an inch broad, each laid at the bottom of a groove in long wood bearers stretched midway between the lines of rails, and supported on square wood blocks saturated with pitch. The insulation appears to be perfect, for when tested by a galvanometer and a battery of five cells not the slightest deflection of the needle takes place. The motor consists of four external magnets coupled together in similar poles, and an armature formed of 16 magnets, traveling in the interval between the external magnets and cutting all the lines of force. It is mounted on one of the ordinary carriages, and the current is drawn off from, and returned to the conductors, by two trailing chains dropping within the conductor channels.

The Telegraph Primer.

What is that Person doing in the Telegraph Office? That is the Manager, and he has a Right to be there. But why is he removing all those Dispatches from the Hooks? Because there is more Business than his Plugs can get away with and he is Preparing to Mail the rest of the Dispatches to their Addresses. Is it a Sharp Trick? Yes, pretty Sharp. It Enables him to sit down and Telegraph all over the country: "Hooks all clear in Detroit." But won't the People be Mad at the Delay of their Telegrams? Yes, my Child, but what are they going to Do About it? Who is that man with the White Hat? He is a Commission Merchant, my Child, But see how Mad he is! He is Red in the Face. He swears. He beats the Air with his Fists. Has Anybody come the String Game on him? No, my Child. He has just received a Telegram from one of his country customers, saying: "Car a you Nevertheless Yesterday Bushels chagrin Therefore Suddenly." And He Won't Have It That Way? No, he can't Make out Whether the Man has sent him Potatoes or wants to know the Price of Oats. Hence his Cuss Words. Hence his Desire to Plug the Plug Operator. Hence his Love for the W. U. T.—*Detroit Free Press.*

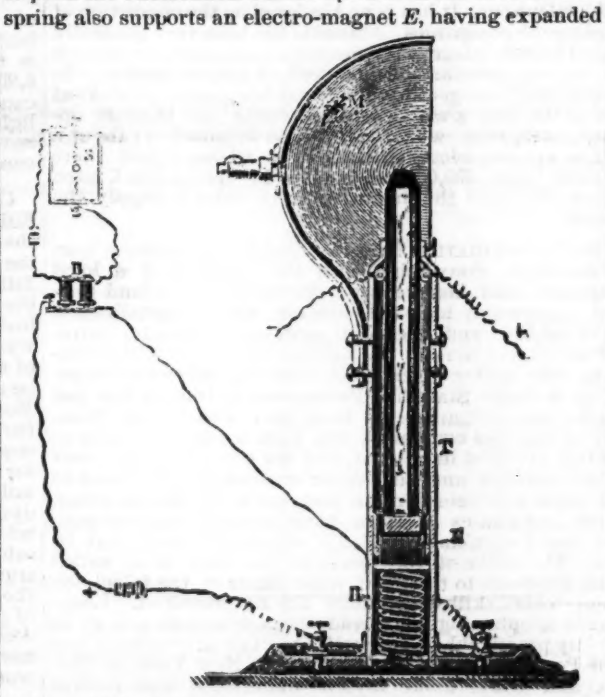
The Electric Candle Regulator of M. Tommasi.

As long as the arc of an electric lamp remains steadily at the same point inside the globe covering it, the diffusion of the rays of light on all sides remains the same, but if the arc moves down as the carbons burn, the angle at which the rays traverse the globe becomes altered at every point, and the change of refraction which results causes a consequent change in the diffusion of the light on the surrounding space. In out-door lighting the difference is scarcely appreciable, but in certain places like factories and workshops, where the operative needs the same amount of light hour after hour, even this slight variation is inconvenient and disagreeable. In the arc lamp this fault is not nearly as pronounced as in the Jablochkoff and other electric candles, for the reason that while in the former the carbons are comparatively thick and burn gradually, lasting several hours, the carbons of the latter are long and slender and consume rapidly, so that the arc travels the whole space from the tip to the lower end in less than two hours. In arc lamps no attempt is made, in the majority of cases, to provide for the upward motion of the lower carbon as the arc descends, because this would make the lamp too complicated and expensive in construction. The lower carbon is consequently left stationary, and the adjustment of the length of the arc is made by the motion of the upper carbon only.

M. Tommasi has sought to overcome the difficulty in the use of the Jablochkoff candle by the use of an ingenious device which is at the same time an interesting application of the curious electrical behavior of selenium under the influence of light. Selenium is one of the chemical elements, and is classed by chemists as a metalloid the same as sulphur, tellurium, etc. Its most wonderful property is that its resistance becomes diminished enormously when it is exposed to the light. A piece of the substance when in the dark possesses such a high resistance that it is practically a non-conductor like sulphur; but on exposure to the light it becomes a conductor to a certain extent.

M. Tommasi takes advantage of this property in his regulator for maintaining the arc of electric candles at the same focal distance, the arrangement being illustrated in the accompanying figure:

At the bottom of a long tube *T* is a spring *R* which tends to push the Jablochkoff candle upward in the tube *T*. The spring also supports an electro-magnet *E*, having expanded



poles, which rest against vertical iron rods which guide its motion. This electro-magnet is included in a local circuit. When the circuit is complete, the poles of the electro-magnet are held attracted by the vertical rods, and the spring is prevented from pushing it and the candle upward. When the local circuit is broken the attraction ceases and the spring pushes the candle upward.

The candle is surrounded by a reflector. If it is desired to maintain the arc of the candle at the centre of the globe, an aperture is made at the side of the reflector half way up, and this aperture receives a tube provided with a lens which concentrates the rays on a selenium element *S*, which is included in the closed circuit of another local battery, in which circuit there is also a relay *B*. When the arc is at the proper height the lens concentrates a sufficient quantity of light on the selenium cell *S* to lower its resistance, and the current passing in this local circuit therefore increases sufficiently to actuate the relay *B*, the armature of which closes the local circuit electro-magnet *E*. However, as the candle burns down the selenium cell fails to receive the same quantity of light. Its resistance therefore increases until the current at *B* is too weak to sustain the armature, which then falls down and opens the circuit of the electro-magnet *E*. Instantly the spring *R* is released, and the candle is pushed upward until the arc comes into the same focus, when the selenium cell again lowers in resistance, and causes the relay to act again as before.

The idea of M. Tommasi seems feasible enough, but it looks rather complicated. It will probably be modified further, so as to render it more simple. The use of selenium as a regulator is a novel idea, and it strikes us now that it might perhaps be useful in many other applications.

Another Claimant for the Invention of the Telephone.

Mr. Antonio Meenis writes from Clifton, Staten Island, under date of July 25, to the editor of the Chicago *Tribune:* "In order to substantiate Mr. Bell's priority in the invention of the telephone under the date of March, 1876, which is so lengthily sustained in the communication of the 21st to all the leading papers, the Examiner at the Patent Office, Washington, ought to be able to annihilate, with substantial facts and demonstrations, the three caveats which he, his predecessor, or the Commissioner of Patents granted to me in the years 1871, 1872, and 1873, through the patent solicitor, Thomas D. Stetson, for my application of same invention, and which three copies are always in my possession, open to public inspection. When such evidence shall be brought forth and made public I shall not hesitate to yield the priority of invention to Mr. Bell or any one else who might be entitled to it, but until then I shall not abandon my rights, and shall call myself, by valid documents, the first American citizen who has obtained from said Patent Office at Washington a caveat which entitles me to the priority of invention of the great contended telephone."

Canadian Cables.

News has been received from Bersimis, North Shore, Lower St. Lawrence River, says a dispatch dated Ottawa, Aug. 7, that Chief Electrician F. N. Gisborne has constructed the land line connections for the cables east of the Bersimis, and has erected a telegraph station house at Point Cove, near Point Paradis, on the peninsular of Manicongan, opposite the lightship.

Meanwhile the Magdalen Island cable to Cape Breton, which was broken by a schooner's anchor eighteen miles out from Meat Cove station, has been repaired; also the Bird Rock cable. The steamship Newfield is to lay the Bersimis cable to Point Ontardes, eleven nautical miles, and the Point Paradis to Godbout River, twenty-eight nautical miles, cable. Next month Chief Electrician Gisborne will complete a land line connection with Point des Monts Lighthouse station. At Point des Monts the River St. Lawrence terminates and the gulf proper commences. The government lines will, however, be continued partly by land and partly by cables northeasterly toward Belle Isle Strait. Mr. Gisborne will shortly proceed to the northwest provinces and on to British Columbia.

A New Telegraph Company.

Articles of incorporation of the New England Telegraph Company were filed in the County Clerk's office, this city, Aug. 7. The general route of the telegraph lines of the new company is to be from a point near the Produce Exchange, in this city, to various cities of this State and New England, the final terminus to be the city of Bangor, Me. The capital stock is $250,000, divided into 2,500 shares, of which George Bowland, of this city, takes 2,000, and David Crowell, of Rahway, N. J., and Frank R. Lord, of this city, 250 each. Mr. George Bowland, who is an expert accountant in a law office in Temple Court, said that he had been asked to lend his name to the company, but he did not know anything about it. He certainly had not invested any money in it. He thought that Daniel C. Robeson and Henry C. Andrews knew something about the scheme. Neither of the gentlemen named could be found by a reporter, who endeavored to hunt them up.

The B. & M. Telegraph Company.

At a meeting of the Bankers & Merchants' Telegraph Company in this city, Aug 9, the issue of a quantity of new stock was authorized. The company is about to add 10 wires to its line between this city and Washington, and also to construct a line to Boston and Chicago. It was, therefore, resolved that 7,000 additional shares of capital stock be issued, and that stockholders of record Sept. 1, 1883, be entitled to preference in the subscription therefor to the extent of two and one-third shares of such additional stock for each share of existing stock then held by them, excluding fractions; that such stock shall be sold at not less than 25 per cent. premium, and shall be deliverable Sept. 20, 1883, at which time the preference granted in the resolution will expire. The directors also declared a cash dividend of 6 per cent., payable on Sept. 10.

Trains on the Bridge to be Run by Telegraph.

Experiments pronounced satisfactory were made August 9 with the cable of the railway soon to be established across the Brooklyn bridge. Telegraphic signals are to be used in the running of the trains. Telegraph instruments with gong attachments have been placed in the New York and Brooklyn stations. The system to be followed is very simple, consisting of four signals. One blow on the gong means "stop," two blows mean "start," three blows "slow" and four blows "experiment." A third instrument and gong is to be put up in the engineer's room, and the other two have been fixed where they can be heard and conveniently used by the train starters.

THE TELEGRAPH.

Donations to the Strikers.—The citizens of Cleveland, Ohio, gave the Brotherhood $628 last week, to encourage them in keeping up the strike.

The Postal and the Western Union.—If the new Postal Telegraph Company relies upon the sympathy and encouragement of the country to establish itself in business, it has not crowded out the Western Union managers any too soon. It would be refreshing to see one telegraph company strong enough to compete successfully for business, that was not organized to be swallowed—with liberal pay for the greasing.—*Boston Advertiser.*

Telegraphic Calls for Ambulances.—The *Herald* continues to advocate the establishment in this city of a system of telegraphic ambulance calls covering its entire area, like the existing fire alarm system. Commissioner Thomas S. Brennan, of the Department of Charities and Correction, says he has devoted a great deal of attention to the matter, and he intends to ask the Board of Apportionment for the money to establish such a system. He would put the boxes on the telegraph poles, establish headquarters with which they would all communicate, take the ambulances away from the hospitals and locate them in ambulance stations at regular intervals over the island. Every policeman and every fireman would carry a key. Wm. J. Elliott Smith, superintendent of the fire alarm telegraph, estimates that if the Fire Department poles could be used, $25,000 would be sufficient for 200 miles of wire and 500 boxes. He thinks that were the system combined with the police or fire department, probably an extra operator for the day and one for the night would be the only persons needed at the headquarters.

THE TELEPHONE.

The American Spiral Wire Telephone Company will stretch a wire from Boston to Lowell on the poles of the Pioneer Company.

Mexican Pacific Telephone.—The Mexican Pacific Telephone Company has an exchange of 70 subscribers in Mazatlan, with connections by wire with the cities of Noria and Rosario, and, as the only telegraph there (owned by the government) is in bad shape, the telephone is much appreciated.

Who Invented the Telephone.—Johann Philip Reis, it is claimed by Professor Silvanus P. Thompson, invented the telephone in 1860. Then he is the man who invented the system of stringing wire netting over the tops of our houses. Bring on your man, Professor Thompson, till we hang him.—*Burlington Hawkeye.*

The Telephone in Navigation.—The telephone has been successfully used in France to communicate between a vessel being towed and one towing. The wire was carried along one of the hawsers, and the circuit was completed through the copper on the bottom of the ships and the water. Conversation was carried on distinctly.

Circumstances Alter Cases.—Hold out the unweighted arm and it will soon fall exhausted to the side. But let a delicate girl, too weak to walk or wield a broom, get interested in a conversation with her beau over the telephone, and she will stand on tiptoe at the wall, holding a "listener" to her ear, meanwhile giggling and screaming for half a day.—*Cincinnati Commercial Gazette.*

Mexican Telephone Stock.—In its issue of Aug. 9, the Boston *Herald* says: "Mexican telephone stock declined sympathetically with the American Bell to sales at 2 today. This stock has held up well, through confidence in the new management, and expectation that an advance would follow the authorization of new stock at the meeting next Tuesday."

Reconstructing the Dayton (O.) Exchange.—It is announced that the telephone system of Dayton, O., is to be entirely reconstructed. New poles will be erected, new general routes adopted, and a more systematic arrangement of lines. The work will occupy several months, and then the exchange will be moved to the southeast corner of Second and Main streets, in the room formerly occupied by the Dayton Gymnastic Club.

The Number of Telephones Issued.—The output of telephones by the Bell company for the month ended July 20 is less than the unofficial estimate of 6,000, but nevertheless quite satisfactory. For the month since Feb. 20, this year and last, the output has been as follows.

	1883.	1882.
March	4,739	5,192
April	7,342	6,690
May	6,758	7,469
June	7,038	6,362
July	5,841	3,787
Totals	31,718	29,500

The Syndicate Farm.—It is announced that the Lowell telephone syndicate has bought a $7,000 farm in Chelmsford, and hired a farmer to raise country produce for the purchasers—that is, the syndicate. The farm buildings have been modernized, which, presumably, includes convenient telephonic communication, the farmer to be roused by the shrill matin crow of a chanticleer, communicated by wire connecting his sleeping-room with the hen-roost, while the housekeeper watches the boiling pot from the sewing-room through the transmission of the sound of the hissing steam by the leading wonder of the nineteenth century. Who wouldn't be the fortunate member of a telephone syndicate?—*Boston Herald.*

American Bell Stock.—The Boston *Herald*, in the financial article in its issue of Aug. 9, says: "Bell telephone shares sold off to 223 this morning, a drop of 50 points since the first of the month. The strong presentation of the Drawbaugh case in the columns of a contemporary this morning may have had influence for lower value, but general causes are a sufficient explanation of the decline. While counsel for the Bell Company are understood to express no apprehension regarding the outcome of the suit against the People's Company, involving the Drawbaugh patents, it must be conceded that Mr. Drawbaugh's friends make out a fair prima facie case. The strongest point in favor of the Bell Company is possession of the field, and this possession gives it, through the power of legal injunction, a great advantage over rivals."

Extending the Telephone System in Maryland.—Mr. H. B. Lytle, General Manager of the Chesapeake & Potomac Telephone Company, has taken charge of the headquarters in Baltimore. Mr. Lytle has been the manager of the Telephone Dispatch Company, of Boston. He thinks Maryland presents a good field for telephone extension and says his company proposes to do a large amount of construction immediately. Frederick, Hagerstown, Cumberland, Annapolis and other places are to be given telephone facilities. Another wire will be completed to Washington to accommodate the large business offering. The company has about 80 employés, including over 30 lady operators, and the Baltimore Exchange has 1,200 subscribers. Mr. J. A. McCoy is Superintendent of Construction. Mr. Lytle says the telephone has the odds in its competition with the telegraph, because it is a direct personal communication between persons using it. The telegraphers' strike has not materially increased the telephone business of the company, because the field of operations is not involved in it. He expects to see Maryland covered by an effective telephone system.

The Erie Company.—The Erie Telephone and Telegraph Company has purchased three hundred miles of the government wire in Texas. These wires have been connected and the balance will soon be ready for use. Upward of a thousand miles of additional wire will be put up before January. Not a mile of line has been built on which the tolls have not been guaranteed for five years. The orders in the Northwest are something like 200 ahead, and applications have been received from six or seven towns in Texas, which the company is not ready to attend to yet. General Manager Downs writes a very interesting letter of July 29 from Cleveland, where he has been investigating matters for the past week. He says: "I have been through matters closely with Supt. McKinistry and find the earnings will exceed your estimations $20,000 per annum, commencing August 1st. I predict an increase of $30,000 more by January. We have 30 orders ahead and took 5 Saturday; will show 2,000 subscribers before April next. I believe with the southwest and northwest this Erie company will double its subscribers in a very short time."

Professor Bell on the Recent Patent Decision.—A correspondent has interviewed Alexander Graham Bell on the recent decision of the examiner of interferences. Mr. Bell said he had just received it in 200 printed pages, and had not time to read it. He said generally that he was glad to see the beginning of the end of the telephone litigation. He informed his hearer that he was still pursuing his investigation in regard to electricity, reading and experimenting almost constantly. Incidentally he was preparing a catalogue of books, pamphlets and even short articles on the subject, with a view to facilitate his own investigation and those of others. He had the titles of 40,000 such productions already. He did not begrudge the hard work involved. Knowledge of what has been done or said in this field would help every electrician very materially. After days of experiment, he sometimes, in fact often, found that a discovery which seemed absolutely new was only new to him. Prof. Bell predicts a great future for the telephone. It has been hindered by the opposition of the telegraph companies. Abroad it has been very generally adopted by the telegraph companies, especially on branch lines, in the cities and at small offices in the country. In this way they can get along without telegraph operators at many of the offices whose receipts would not support operators, and they would not be so crippled in case of a strike as are our telegraph companies to-day. Still there are more than 500,000 telephones in use in the United States to-day, and the manufacturers cannot supply the demand.

More Consolidation Talk.—A prominent business man of Pittsburgh, conversing with the reporter of a local newspaper, said last week: "All the New England telephone companies have consolidated, with a capitalization of $16,000,000, and I expect soon to see a similar movement set on foot here as well as elsewhere. It will probably be the policy to consolidate all the different companies in a large State like Pennsylvania, though it is just possible the reorganization here may also include Ohio. Each of the new companies will have a superintendent at a central point of its district, and the cost of management will be reduced and such other economies introduced as must tend to a considerable increase in the net earnings. All the companies in Iowa have already been consolidated, and I shouldn't wonder if we should come next in order. The strike of the operators has once more called special attention to the great possibilities of the telephone system, where skilled operators are not required. Long-distance telephoning has already been demonstrated to be perfectly practicable. I myself have talked over the wires of the Postal Telegraph Company from New York to Chicago, and could make myself understood and receive satisfactory replies. The system, of course, is not yet brought to perfection, but it will be. They are now working on a long-distance telephone which gives every promise of complete success. It is all a matter of the complete adjustment of the strength of the battery. With the system in good shape and telephone lines to the Eastern cities, difficulties like the present would be entirely obviated." He added that such a consolidation as that spoken of above would give telephone stock such a boom as would make present prices dirt cheap.

The Telephone in Kansas.—The Kansas City *Journal* of August 1 says: "At 4 o'clock yesterday afternoon telephone connection was perfected between Kansas City and Topeka, a distance of seventy miles, via Lawrence, and several successful conversations were carried on. Between here and Lawrence, a distance of forty miles, parties conversed easily in an ordinary tone of voice, and several persons in that place called up and talked with Kansas City friends. The heavy atmosphere and rainfall caused a noticeable induction when connection was made with Topeka, and interfered somewhat with the successful working of the line, but the telephone company claim that this will not be noticed in clear weather. Notwithstanding the induction, conversation was carried on between Kansas City and Topeka very successfully, Manager Price, of this city, being able to talk with his wife in that city with but little difficulty. The construction of this line connects this city permanently with these two cities and is the inauguration of the proposed scheme to make Kansas City the centre of telephone communication, comprising the cities of St. Joe, Leavenworth, Atchison, Topeka, Lawrence and Independence. This morning General Superintendent E. L. Smith starts a gang of men for Leavenworth to connect that city and Atchison, the latter place being already connected with St. Joe. The Leavenworth line is now being constructed, and within the next few weeks the above mentioned circuit will be completed and ready for business. The entire system in this city is also being reconstructed, a gang of twenty-five men being busily engaged in setting new and larger poles and transferring the wires." The *Journal* is wrong in saying that the wet weather caused induction, as induction is most active in dry weather and with high insulation. If the trouble was attributable to the dampness, it must have been in the nature of leakage from wire to wire.

THE ELECTRIC LIGHT.

Incorporated.—The Kingsland & Robbin Electric Light Company, of Cook County, Ill.; capital stock, $16,000. Incorporators: P. S. Kingsland, George Kingsland and David H. Robbin.

The Electric Light at Lowell, Mass.—Lowell has appropriated ten thousand dollars of the city funds for providing the city with the electric light. The Middlesex Electric Company have the work in hand.

Orders for Storage Batteries.—The Cleveland *Leader* says an exhibition of the Brush-Swan system of incandescent lighting was recently given at Fargo, Dakota Territory, which attracted favorable comment from all who were present, and the Brush Electric Company, of Cleveland, is receiving a number of orders for storage batteries from Fargo, in consequence.

Electric Light for Allegheny, Pa.—The Allegheny County Electric Light Company, of Pittsburgh, Pa., has submitted to the Council of Allegheny City a proposal to furnish a twenty-light dynamo-electric machine, with arc lamps, steam-engine, etc., for the illumination of the market house of the latter city, for the sum of $4,300. The company offers to erect and put the machinery in complete operation and await payment until 1884.

Another Decision Against Sawyer and Mann.—In the patent interference case of Weston against Sawyer and Mann, of New York, involving priority of invention for improvement in the art of manufacturing carbon conductors for incandescent lamps, the examiner of interferences on August 3d rendered a decision awarding the priority of invention to Weston. The attention of the Commissioner of Patents is called to the fact that the record shows a public use of the invention by both Weston and his opponents for more than two years prior to the filing of the former's application. It is probable that this may act as a statutory bar to granting a patent to Weston.

Heat from Electric Light.—The general knowledge that the electric light produces very little heat in proportion to its illuminating power, has been reduced to figures by *Nature*, which gives the following result of careful experiments: The heat from an arc lamp of 100 candle-power is from 57 to 158 heat-units, that of the incandescent lamp of equal brilliancy, from 290 to 536. The argand gas-burner is the next best light in point of coolness, but this is represented by 4,860 heat-units, a colza oil lamp by 6,800, a flat wick petroleum lamp by 7,200, a paraffin candle by 9,200, and a tallow candle by 9,700. Light for light, therefore, the heat of an electric arc lamp under the most favorable circumstances is to the heat of tallow candles as 1 to 170.

Cheapening the Light.—At a recent meeting of the Edison Electric Lighting Company, of Manchester, Eng., the chairman stated that Dr. Hopkinson, the electrician of the Edison company in London, had so far improved the Edison dynamo that it was capable of doing three times the work it formerly did; in other words, the cost of an installation was divided by three, so far as the dynamo was concerned. The secretary said that, assuming the cost of an installation of 1,000 lights to be £2,000, there would be a saving of £800 with the new dynamo. Mr. Charles Mosley, one of the directors, said the company could now furnish an estimate for lighting a cotton mill, which only required light for about three hundred hours per annum, for about the same price as gas would cost for the same mill, provided the mill-owner found the power to drive the dynamo, and that, of course, would be a trifling matter where there was power already in use. Mr. W. A. Turner said that his mill in Pendleton was lighted with the electric light during the last winter, and the cost was about the same with the old dynamo, putting aside the question of power, as that of gas, but the results on the health and comfort of the workpeople were so beneficial that he believed, if they proposed to put gas in the mill again, they would have a strike.

An Electric Revolution in Locomotive Headlights.—A special dispatch dated Indianapolis, Aug 3, to the Cincinnati *Commercial Gazette*, says that there is quite a revolution promised in the matter of headlights for locomotives. A modest inventor of that city, who will not consent to even have his name mentioned as yet, is about perfecting an electric headlight which will douse the glim of everybody else that ever made a similar light. Three or four electricians and electric companies have endeavored to make a light that would stand the jar and rattle of the locomotive—all have thus far failed. This claims to be a success. It was on exhibition at Chicago, and has been thrown upon the floor, jammed up against posts and pillars, rammed against walls, and the light cannot be put out. It will equal the light of four thousand candles—brilliant, continuous and full. The track will be made as plain as day for a mile in front of the engine. The electricity will be generated on the engine with a small dynamo opposite the air brake, and is not as large as the brake. The entire affair will cost about $600 per locomotive, and will last as long as the latter will. Steam from the locomotive runs the affair at the will of the engineer. The president of a prominent locomotive works, who is also a director in the Erie Road, has offered to take the entire stock owned by a company, adds the enthusiastic correspondent, not entirely formed, which owns one-half the United States. The other half is owned by the Ohio Power and Light Company, of Dayton, Ohio. Your correspondent saw the engine and light to-day, and a possible exhibition will be made next week. It looks as if it would prove a grand success. In connection with this dynamo, located on each engine, it is proposed to light up depots, tunnels, railroad crossings, bridges, etc., in this way: For a mile or a half a mile before and after the object to be lighted is reached there will extend along the rail a wire which, touched by the brush from the dynamo, will communicate the electricity to the lamp at the depot, tunnel, crossing or bridge. As soon as the object is passed, or rather as soon as the train reaches the end of the wire beyond it, the light goes out. After the exhibition next week more will be known regarding the matter.

MISCELLANEOUS NOTES.

A NEW ELECTRIC RAILWAY.—Among the curiosities which will be exhibited at the approaching International Electrical Exhibition at Vienna will be a short wire-rope railway, in which the motive power is electricity. This novelty will not be a mere toy model for the amusement of visitors, but will be employed to convey coals from the railway on the banks of the Danube to the rotunda in which the exhibition is to be held in the Prater. The line will also be peculiar, from the fact that it will run above the roofs of the sheds surrounding the Rotunda, and terminate in a court, or open space, where a boiler-house has been erected.

ELECTRICITY IN MINES.—A new application of the electrical transmission of power has lately been made in the Trafalgar collieries, Forest of Dean, England. From the surface a dynamo-electric machine sends, a distance of 500 feet down the shaft and along the workings, by means of two wires, electricity for an electric motor. The latter sets a pump in motion and forces the water in the mine to the bottom of the shaft, whence it is raised to the surface by an ordinary steam-pump. The total vertical lift of the electric pump is 115 feet, but the length of the pipe through which the water flows is 500 yards.

AN ARTIFICIAL CYCLONE.—Prof. Douglas, of Ann Arbor University, Mich., makes an artificial cyclone in the following manner: He suspends a large copper plate by silk threads, and charges it heavily with electricity. The latter is said to hang down like a bag underneath, and is rendered visible by the use of arsenious acid gas, which gives it a green color. This formation is a miniature cyclone, as perfect as any started in the clouds. It is funnel shaped and whirls around rapidly. Passing this plate over a table, the cyclone snatches up copper cents, pens, pith-balls, and other objects, and scatters them on all sides. The experiment is often made in Ann Arbor, and all the students are familiar with it. Perhaps some of them will explain what is meant by the electricity hanging down like a bag.—*English Mechanic.*

TRIPLE THERMIC MOTOR.—The Triple Thermic Motor invented by W. S. Colwell, and now in use in New York, is charged with bisulphide of carbon, especially prepared for that purpose, and is said to be entirely free from the disagreeable, dangerous qualities attributed to that substance. The vapor is odorless, and its powers are so restricted and governed, that there is believed to be far less danger from its use than there is from steam. The motor in use is attached to a sixty horse-power engine, which is connected with a stone crusher and other machinery. A small quantity of fuel is sufficient to warm the water in the outer shell, and with a slight pressure on the steam gauge, the necessary energy is generated to drive the engine and its attachments. The motor is inclosed in an ordinary steam boiler and is sensitive to the slightest heat, sufficient power being generated to run the engine two hours after the fire in the boiler is drawn. A syndicate has purchased the right for the State of Pennsylvania for over a million dollars, and the attention of many capitalists is being attracted to the newly developed power.

STOCK QUOTATIONS.—Telegraph, telephone and electric light stocks were quoted on Wednesday of last week and Thursday of this week as follows:

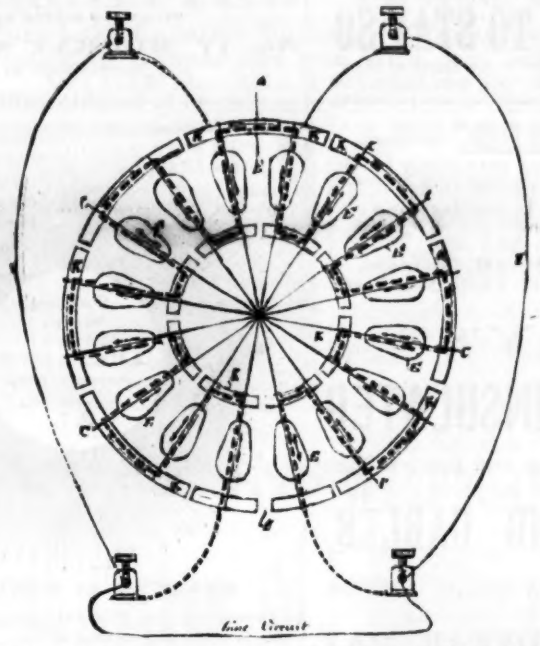
	Aug. 1.	Aug. 9.
American Cable	66½	66
Bay State Telephone	....	132
Bell Telephone	272½	223⅓
Bankers and Merchants' Tel	123	....
Currier Telephone Bell Co	20	20
Granite State Telephone	85	85
Mexican Telephone Co	2¼	2
Mutual Union Telegraph	19	....
National Bell Telephone of Maine	80	78
People's Telephone	8½	...
Suburban Telephone Co	130	....
Tropical Telephone	2	....
Western Union Telegraph	80¼	79¼
Long Island and New Jersey Telephone.	....	100
New York and Pennsylvania	....	90
Boston & Northern Telephone	....	132
Union Telegraph and Telephone	....	100
United States Electric Light	....	121¾
American District Telegraph	....	28

THE STOCK MARKET.—The *Economist* in its weekly report of the stock market says in reference to telegraph, telephone and electric light stocks: In New York but little has been done in electric light stocks. Western Union Telegraph continues the great interest of the day, the price ranging from 79¼@81¼, and the dealings 55,000 shares. American cable sold at 66½@67½; Bankers and Merchants at 123; Mutual Union at 19@17½, declining 1½ on sales of 20 shares. In Boston the American Electric and Illuminating Company has declared the following dividends: First, guaranteed semi-annual dividend of 4 per cent. on preferred stock; second, an extra semi-annual dividend of 2 per cent. on preferred stock; and third, a semi-annual dividend of 2 per centi on the common stock. The Weston Electric Company's plant in Springfield has been purchased by the Massasoit Electric Light Company, which will replace the Weston lights by the American or Thomson-Houston system. The Bell Telephone stock has been shaken up pretty badly by a drop of ten points to 263. General Manager Downs, of the Erie Telephone Company, estimates that the company will have 2,000 subscribers before April 1, 1884. Mexican Telephone sold at 2½; Bay State offered at 120; Boston and Northern bid 142; Erie bid 63½; Granite State, 80@90; National Bell, of Maine, 80@82; New York and New Jersey, 100@101; New York and Penusylvania, 91@93; Suburban, 130; Union, 110; Currier, 20@25.

ELECTRICAL PATENTS ISSUED

And Dated July 31, 1883.

Automatic regulator for dynamo-electric machines; Franz S. Giel, Brooklyn, N. Y. 282,187
Apparatus for lighting cars by electricity; George D. Burton, New Ipswich, N. H. 282,158
Apparatus for measuring electric currents; Sebastian Ziani De Ferranti and Alfred Thompson, England. 282,447
Dynamo-electric machine; Edward R. Knowles, Brooklyn, N. Y. 282,459
Device for lighting petroleum or gas lamps; Paul Richter, Germany. 282,227
Dynamo-electric machines for printing telegraphs; Stephen D. Field, New York, N. Y. 282,297
Dynamo telegraphy; Stephen D. Field, New York, N. Y. 282,294-5-6
Electric bell-pull; Frank J. Wall, Lawrence, Mass. 282,246
Electric-lighting gas burner; A. L. Bogart, Jamaica, N. Y. 282,043
Dynamo-electric machine; Sebastian Ziani De Ferranti and Alfred Thompson 282,446

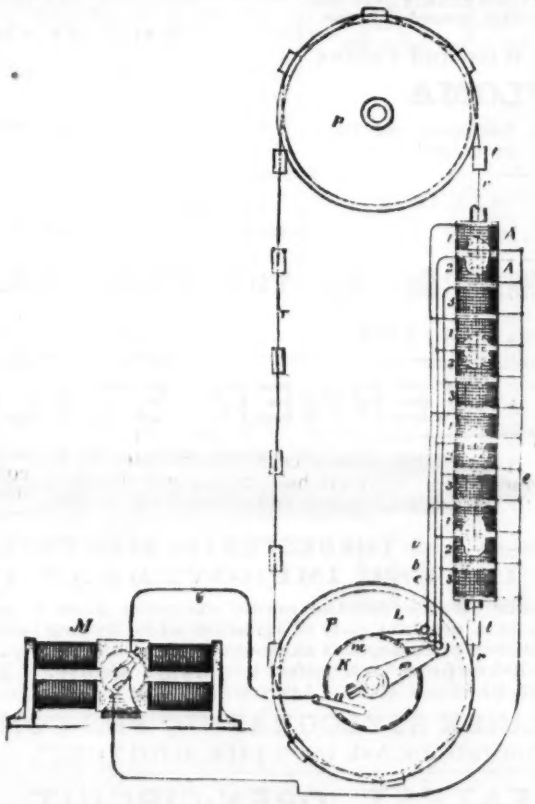


Claim 1. In the construction of the armatures of dynamo-electric machines or electric generators for producing continuous currents, the combination of radical conducting-bars and contact-plates or equivalent contact mechanism, substantially as hereinbefore described.

2. The combination of a number of magnet-poles ranged in a circle with a number of radial conducting-bars carried by an axis and revolved in front of the magnet-poles, and with contact-plates or equivalent contact mechanism by which the outer ends of the radial bars which at any time are in front of two of the adjoining magnet-poles are set in electrical connection with one another, also with other contact-plates or equivalent contact mechanism by which the inner ends of the radial bars which are in front of each of these magnet-poles and of the next succeeding magnet-pole are similarly put in electrical connection with one another, so as to form a zigzag circuit through the several portions of the armature, substantially as described.

3. In the construction of the revolving armatures of dynamo-electric machines, the combination of radial conducting-bars having dovetail feet with a wheel formed in two halves, drawn together by bolts, and with both halves grooved to receive and hold between them the dovetail ends of the radial bars, substantially as described.

Electric-arc lamp; Edward R. Knowles, Brooklyn, N. Y. 282,461
Electric lamp globe; George D. Burton, New Ipswich, N. H 282,157
Electric ore-separator; Herman Greve, St. Paul, Minn. 282,073
Electro-magnetic dispatch-tube; Chas. A. Cheyer, New York 282,165

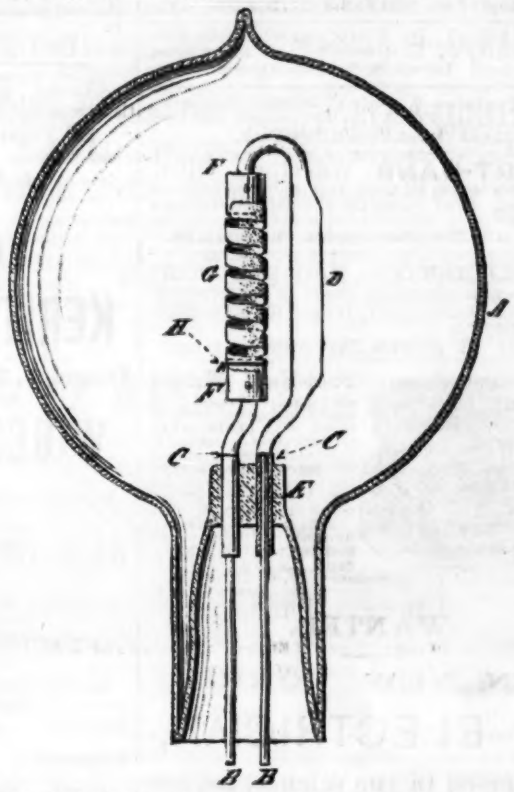


This invention is intended to utilize the attraction of a solenoid on a number of hollow iron receptacles, so as to convey them and their contents from one end of the solenoid to the other. The solenoid is divided into a number of sections 1, 2, 3, 1, 2, 3, which are connected into sets to the same circuit. The current from a dynamo is passed through the sets in rotation by a commutator, so that each section of the solenoid may be made to act successively on the iron receptacles moving through them. The invention is applicable to various purposes. The figure represents its use as a grain elevator.

Electro therapeutic apparatus; Abiel W. K. Andrews, Binghamton, and Cyrus R. Teed, Syracuse, N. Y. .. 282,431
Incandescent electric lamp; Isaac Adams, Jr., Boston, Mass. 282,030
Joint for electric-light brackets; Chas. H. Hinds, New York, N. Y. 282,317
Joint for electric light; Charles H. Hinds, New York, N. Y. 282,328
Lightning-rod; Thomas H. Dodge, Worcester, Mass. ... 282,449
Manufacture of incandescent lamps; Alfred Swan, England 282,472
Magneto-electric signaling apparatus; Thomas A. Edison, Menlo Park, N. J. 282,287
Ozone apparatus; Henry D. Hall, New York 282,190
Railway electric signal apparatus; Charles A. Scott, Boston, Mass. 282,229-30
Secondary battery; Eli T. Starr, Philadelphia, Pa. ... 282,396
Secondary electric battery; Charles J. Van Depoele, Chicago, Ill. 282,414
Incandescent electric lamp; Edward R. Knowles, Brooklyn, N. Y. 282,460

Brief.—The platinum connections through the glass bulb in the form of tube, through which the copper wire conduc passes. The glass used has a peculiar composition so that its of expansion is the same as that of the platinum tube. The bon filament is in the form of a flat spiral strip to obtain lar surface.

Claim.—1. In combination with the globe of an incandescen electric lamp, a tubular platinum connection passing through an



sealed into the globe, whereby a certain connection between th glass and the platinum is secured.

2. A carbon for electric lamps, which consists of a spirally-coiled flat carbon, substantially as shown and described.

3. In an electric lamp, and in combination with the leading-in wires, a globe of glass which contains from forty-six (46) to forty-eight (48) per cent. of oxide of lead, from forty-three (43) to forty-four (44) per cent. of silica, and from eight (8) to ten (10) per cent. of potash or soda, or a mixture of them, substantially as described.

4. In an electric lamp, the combination of a platinum tube with the glass of a lamp, said glass consisting of a composition of oxide of lead, silica, and potash or soda combined, substantially as described.

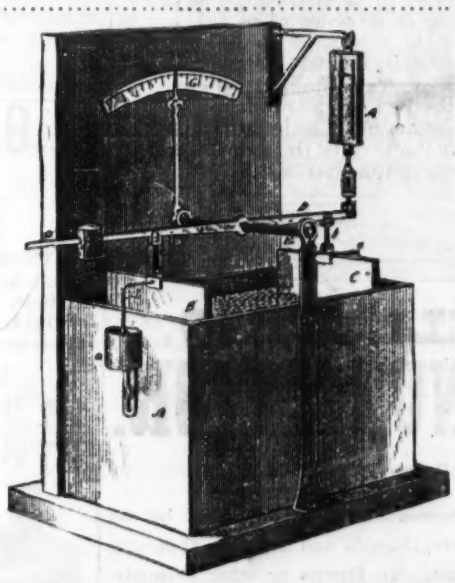
5. The combination, in an electric lamp, of two platinum tubes passing through the glass globe and sealed therein, the said tubes being provided with enlarged ends or holders, and a spirally-coiled flat carbon, the ends of which clasp or surround the enlarged holders, substantially as described.

6. The combination, in an incandescent lamp, of a hollow platinum tube passing through the glass and sealed therein the glass being composed of a compound of oxide of lead, silica, and potash or soda, in substantially the proportions set forth, and a copper conductor passing through the platinum tube, substantially as described.

7. The combination, in an incandescent electric lamp, of two platinum conductors passing through the glass and sealed therein, the said conductors being provided with enlarged ends, and a spirally coiled flat carbon, the ends of which clasp or surround the enlarged holders, substantially as described.

8. The combination, in an incandescent electric lamp, of two conductors sealed therein, one of the said conductors terminating in an enlarged end, the other being extended to near the top of the globe, bent in a reverse direction and provided with an enlarged end, and a spirally-coiled flat carbon connected to the enlarged ends, the extended portion of the conductor opposite the carbon being flattened, as at D, substantially as described

Secondary battery indicator; E. Weston, Newark, N. J. 282,428



Brief.—The plates of a secondary battery are suspended from a beam. The change of weight in the plates due to charge and discharge causes the beam to swing, and the extent of motion of the latter may serve to indicate the amount of charge or discharge.

Claim.—1. The combination, with a secondary battery-cell, of electrodes capable of movement therein, due to changes in weight or specific gravity, and indicating mechanism constructed to operate in consequence of such movement, substantially as set forth.

2. The combination, with the electrodes of a secondary battery, suspended or balanced as set forth, of indicating mechanism constructed or arranged to be moved or operated by the movement of said electrodes, as described.

3. The combination, with a secondary battery-cell, of a balanced beam or lever, plates or electrodes suspended therefrom, and an indicating-arm constructed to be operated or moved by changes in the position of said beam, imparted to it by changes in the weight or specific gravity of the electrodes, as set forth.

4. The combination, with the plates of a secondary battery, suspended so as to be capable of movements due to changes in their relative weights or specific gravities, of mercury contact cups and connections from the plates to the cups, as and for the purpose set forth.

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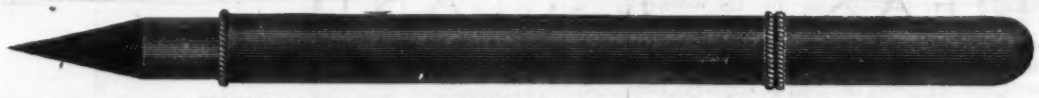
$1.00.  $1.00.

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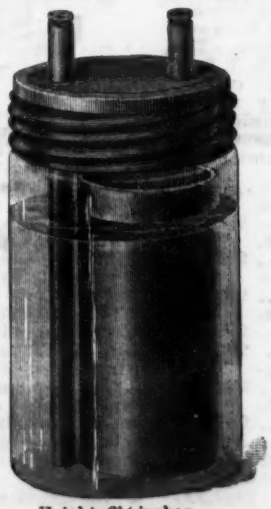

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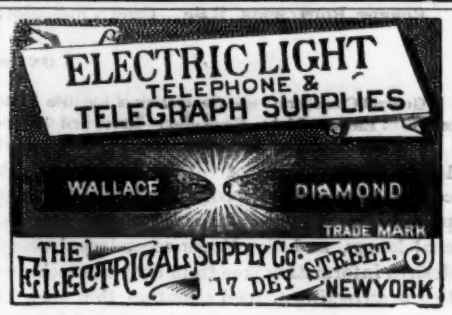

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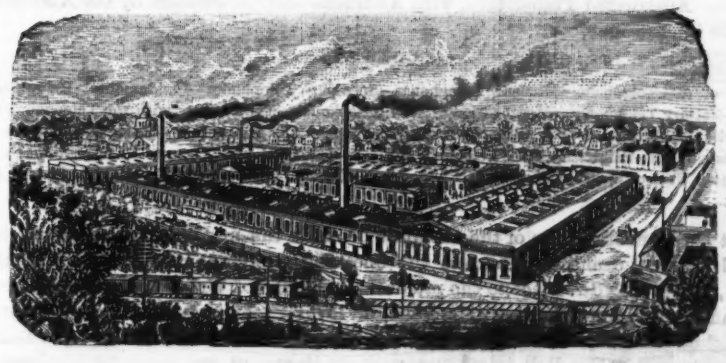

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TELEPHONY.

PRACTICAL INFORMATION FOR TELEPHONISTS. By T. D. Lockwood, Electrician, American Bell Telephone Company. 12mo, cloth. New York, 1882. $1.00.

CONTENTS.

Historical Sketch of Electricity from 600 B. C. to 1882 A. D.—Facts and Figures about the Speaking Telephone—How to Build a Short Telegraph or Telephone Line—The Earth and its Relation to Telephonic Systems of Communication—The Magneto Telephone; What it is, How it is made, and How it should be handled—The Blake Transmitter—Disturbances Experienced on Telephone Lines—The Telephone Switch-Board—A Chronological Sketch of the Magneto-Bell, and How to Become Acquainted with it—Telephone Transmitter Batteries—Lightning; its Action upon Telephone Apparatus; How to prevent or reduce Troubles Arising therefrom—The Telephone Inspector—The Telephone Inspector; his Daily Work—The Inspector on Detective Duty—The Daily Routine of the Telephone Inspector—Individual Calls for Telephone Lines—Telephone Wires *versus* Electric Light Wires—Electric Bell Construction—Housetop Lines, Pole Lines and Aërial Cables—Anticipations of Great Discoveries and Inventions.

The chapters of which this book is composed were originally published in The Operator, where they were found so useful to practical telephone men as to induce an imperative demand for their re-publication in the present convenient form. The book, while giving a mass of valuable information, such as could only be acquired by an extended practical experience with the telephone, is written in an easy, chatty style, which makes it entertaining reading. It is the only book that contains a description of the Blake transmitter, now used almost universally throughout the United States. No one who has anything to do with telephones can fail to find in it something of interest or value; but it is particularly useful to the managers and employés of telephone exchanges, as it gives them valuable instruction about every detail of their work.

THE TELEPHONE. An Account of the Phenomena of Electricity, Magnetism and Sound, as Involved in its Action; with Directions for Making a Speaking Telephone. By A. E. Dolbear. Second Edition. 18mo, cloth, 17 illustrations. Boston, 1883. 50c.

CONTENTS.

Electricity—Magnets—The Galvanic Battery—Other Means for Generating Electricity—What is Electricity?—Sound—Correlation—Reiss, Gray, Bell and Dolbear Telephones—How to Make a Telephone.

A very interesting little volume, which clearly explains the fundamental principles of the telephone in an able manner. The first edition had a large sale, and the demand for the book still continuing, a second edition has just been issued at a reduced price.

THE TELEPHONE. A Lecture by Prof. Alexander Graham Bell, Delivered before the Society of Telegraph Engineers. 8vo, paper, 30 illustrations. London, 1870. 60c.

This is a complete and concise account of the stages of experimentation gone through by Professor A. Graham Bell, before his researches resulted in one of the greatest triumphs of modern science. All who believe Bell to be the original inventor of the speaking telephone should have a copy of the work from which to quote. All who believe that he was not, should have one, so as to acquaint themselves with what can be advanced in support of the claims made for Bell. In fact, everybody interested in telephony should read it.

THE TELEPHONE, THE MICROPHONE, AND THE PHONOGRAPH. By Count du Moncel. Authorized Translation, with Additions and Corrections by the Author. 12mo, cloth, 70 illustrations. $1.25.

CONTENTS.

History of the Telephone—Musical Telephones—Speaking Telephones—Fundamental Principles of Bell Telephone—Battery Telephones—Modification of Bell Telephones—Experiments with the Telephone—Other Experiments with the Telephone—The Microphone—Applications of the Microphone—External Influence on Telephonic Transmissions—Establishment of Telephone Station—Call-Bells and Alarums—Applications of the Telephone—Various Uses of the Telephone—The Phonograph—Uses of the Phonograph—Faber's Speaking Machine—Appendix.

Count Du Moncel's is one of the cheapest books in the market. In his accustomed easy and popular style the author discusses the speaking telephone. Beginning with the Reiss telephone, and giving due place to the musical telephones of Wray, Pollard and Garnier and Varley, and the well-known string telephone, or lovers' telegraph, the magneto telephone of Bell is reached and fully described. After this the respective claims of Gray and Bell are impartially canvassed. The Bell telephone, with its thousand and one modifications, the battery telephone and microphone, with the adaptations of both to oral communication, pass before the reader in turn. A chapter is devoted to disturbances which appear on telephone wires, and another to the phonograph. Those who can only afford one book on the telephone, should make a point of securing this one.

THE SPEAKING TELEPHONE, ELECTRIC LIGHT, AND OTHER RECENT ELECTRICAL INVENTIONS. By George B. Prescott. 8vo, cloth, 319 illustrations and 1 plate. New York, 1879. $4.00.

CONTENTS.

The Speaking Telephone—Bell's Telephonic Researches—The Telephone Abroad—History of the Production of Galvanic Music—Gray's Telephonic Researches—Edison's Telephonic Researches—Electro-Harmonic Telegraphy—Dolbear's Telephonic Researches—Improvements of Channing, Blake and others—The Talking Phonograph—Quadruplex Telegraphy—Electric Call Bells—The Electric Light—Edison's Recent Telephonic and Acoustic Inventions—Duplex Telegraphs, Electro-Magnets and Electric Time Service.

This is a large and handsome work, the object of which is to furnish the public with a clear and accurate description of the more recent and useful improvements in electrical science, and especially to explain the principles of that marvelous production, the speaking telephone. The most interesting portion of the work, to most readers, is the history of the original telephonic researches of Bell, Gray and Edison, the account of each inventor's experiments being given in his own words. It contains also a very thorough description and explanation of the quadruplex telegraph, with numerous diagrams, showing how the wires are arranged, and gives excellent accounts of the Brush, Maxim, Jablochkoff, Thomson-Houston, and other systems of electric arc lighting, with descriptions of the dynamos, etc. The illustrations throughout the work are very fine.

ELECTRIC LIGHTING.

ELECTRIC LIGHT, ITS PRODUCTION AND ITS USE; EMBODYING PLAIN DIRECTIONS FOR THE WORKING OF GALVANIC BATTERIES, ELECTRIC LAMPS AND DYNAMO-ELECTRIC MACHINES. By J. W. Urquhart, C.E. Edited by F. C. Webb, M.I.C.E., etc. 8vo, cloth, 94 illustrations. London, 1880. $3.00.

CONTENTS.

Introduction—Voltaic Batteries—Thermo-Electric Batteries—Magneto-Electric Generators—Electro Magnetic Electric Machines—Dynamo-Electric Machines—General Observations on Machines—Electric Lamps and Candles—Measurement of Electric Light—Mathematical and Experimental Treatment of the Subject—Application and Cost of the Electric Light.

A very convenient and complete treatise on the electric light. The principles are defined in a manner devoid of technicalities, so as to render the book very valuable to the beginner. The history of the dynamo-electric machine and its development, from the Pixii to the Gramme machine, is also quite complete. The recent types of machine receive a full share of attention and the various styles of lamps are treated in full.

ELECTRIC LIGHTING. Translated from the French of Le Comte Th. du Moncel, by Robert Routledge, B.Sc. Crown 8vo, cloth, 76 illustrations. London, 1882. $1.25.

CONTENTS.

General Considerations—Generators of Electric Light—Electric Lamps—Cost of Electric Lighting—Applications of Electric Light—Conclusion—Notes and Appendices.

A translation of the work of this prolific writer on electrical subjects, published at Paris, in 1880, under the title of "L'Eclairage Electrique," to which the translator has added brief accounts of the apparatus connected with electric lighting which have been brought forth since the publication of the original edition, viz., Swan's, Maxim's, Edison's, and Fox-Lane's incandescent lamps, and the Faure secondary battery. To the student or the general reader who desires information free from abstruse technicalities, and at an insignificant cost, on a subject that is attracting general attention, this work, the original of which is one of a popular science series, can be recommended. The object held constantly in view by the author was to make the treatise thoroughly practical. The book is the cheapest one that aims to cover the whole ground of electric lighting.

ELECTRIC LIGHTING AND ITS PRACTICAL APPLICATION; WITH RESULTS FROM EXISTING EXAMPLES. By J. N. Shoolbred. 8vo, cloth, 5 plates. London, 1879. $2.00.

CONTENTS.

Historical and Descriptive—Electric Light Machines—Lamps and Regulators—Carbons; Conducting Wires—Motive Power—Luminous Intensity—Applications; Economic Results—Prospects of Electric Lighting.

A handy little treatise, very valuable to the beginner. The author adopts a popular method of treating the subject and avoids technicalities as much as is compatible with the precision of the work. The history of the early efforts in this field is given, the apparatus being briefly described in each case. The notice of recent inventions, up to the date of print, is quite complete. The questions of power and of photometry form the subjects of very interesting and instructive details.

USEFUL INFORMATION ON ELECTRIC LIGHTING. By Killingworth Hedges, M.S.T.E. Fourth Edition, Revised and Enlarged. Crown 8vo, cloth, 20 plates. London, 1883. $1.75.

CONTENTS.

Production of Electricity—Voltaic Arc—Division of the Electric Light—Machines or Generators—Power required, and Motors—Application of the Electric Light—Choice of a System—Setting to Work—Cost of Working—Measurement of Light and Current—Storage of Electricity and Transmission of Power—Electrical Measurement of Work—Useful Memoranda.

The first edition of this work met with so great a success as to encourage the issue of enlarged second and third editions, which have in turn been exhausted. A fourth edition, still further enlarged, has just been issued.

ELECTRIC LIGHTING BY INCANDESCENCE, AND ITS APPLICATION TO INTERIOR ILLUMINATION. A Practical Treatise. By William E. Sawyer. 8vo, cloth, 96 illustrations. New York, 1881. $2.50.

CONTENTS.

Introduction—Generators of Electricity—Generators of the Gramme Type—Generators of the new Siemens Type—Incandescent Lamps—Carbons for Incandescent Lighting—New Forms of Lamps—Preservation of Incandescent Carbons—Division of Current and Light—Regulators and Switches—General Distribution—Commercial Aspects.

This book is an indispensable addition to the libraries of all who desire to keep up to the age in the novelty of electric lighting. Its author neglects the arc light altogether, and gives his readers a graphic account of the generators employed in the production of the necessary currents; of those lamps which utilize the currents when generated; of the most advantageous circuit arrangements and apparatus, and of the best materials to use in lighting by incandescence. A historical sketch shows that the idea of electric lighting by incandescence is as old almost as telegraphy itself. The book is handsomely printed and copiously illustrated.

INCANDESCENT ELECTRIC LIGHTS, WITH PARTICULAR REFERENCE TO THE EDISON LAMPS AT THE PARIS EXHIBITION. To which is added The Economy of the Electric Light by Incandescence, by John W. Howell; and On the Steadiness of the Electric Current, by C. W. Siemens. Illustrated. 18mo, boards. New York, 1882. 50c.

There is no book that contains more valuable information in the same space than this On the question of incandescent lights it must be considered the best authority at present accessible. The tables and data given help very much in analyzing facts and making comparisons. The article by Mr. C. W. Siemens is especially valuable and interesting. It refers to a new method of exciting the field of dynamo-electric machines, which enables the current to maintain itself constant in the external circuit, no matter how great and rapid the variations of resistance may be. This method has come into use as a most valuable adjunct in the dynamos intended for incandescent lamps, where it enables any of the lamps to be put on and off at will without affecting the rest. For this reason this article is of great interest to every person interested in electric lighting.

VARIOUS APPLICATIONS.

ELECTRO-MOTORS. A Treatise on the Means and Apparatus employed in the Transmission of Electrical Energy and its conversion into Motive Power. By J. W. Urquhart. 12mo, cloth, illustrated. London, 1882. $3.00.

CONTENTS.

Introduction—On the Dynamical Nature of Electric Currents—Electrical Measurements—Electro-Magnetic Force—Electro-Magnets and Armatures—Electric Accumulators or Magazines—The Construction and Efficiency of Electro-Motive Machines—Electric Railways—Minor Applications of Electro-Motive Energy—Fragmentary Information.

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ELECTRIC TRANSMISSION OF POWER; ITS PRESENT POSITION AND ADVANTAGES. By Paget Higgs, LL.D., D.Sc. Crown 8vo, cloth, 21 illustrations. London, 1879. $1.20

CONTENTS.

Dynamo-Electric Machines—The Gramme Machine—The Brush Machine—The Wallace-Farmer and Siemens' Machines—Efficiency of Dynamo-Electric Machines—Practicability of Transmission of Power by Electricity—Efficiency of Coupled Machines—Comparative Efficiency of Various Machines—Other Theoretical Considerations—Conclusions.

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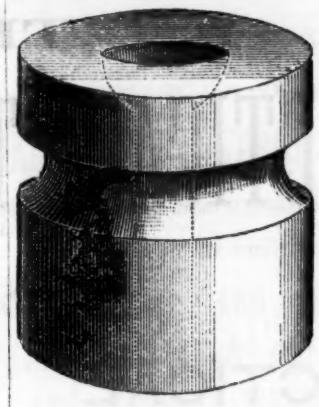

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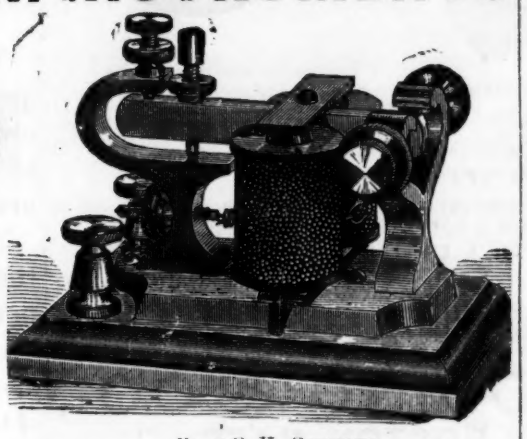

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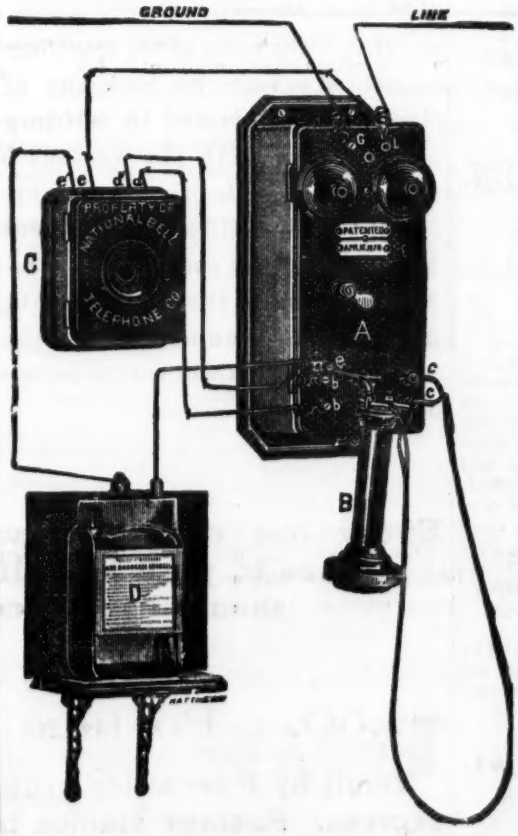

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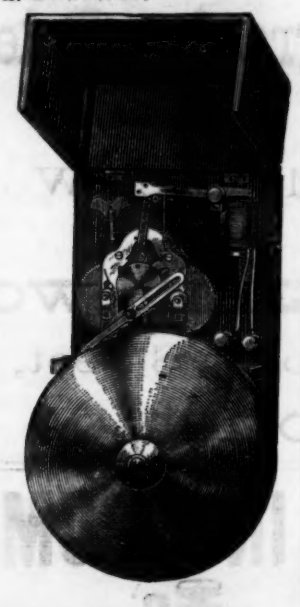

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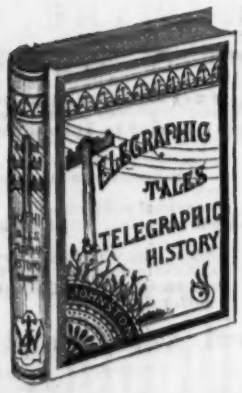

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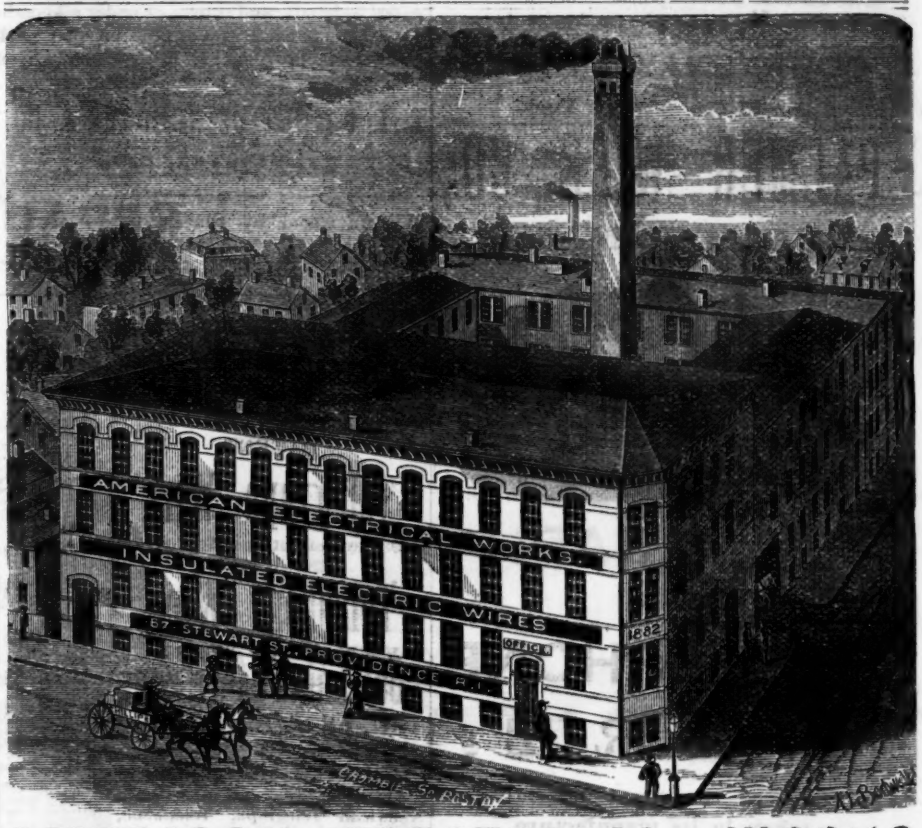

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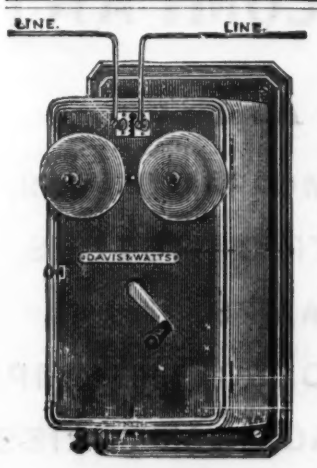

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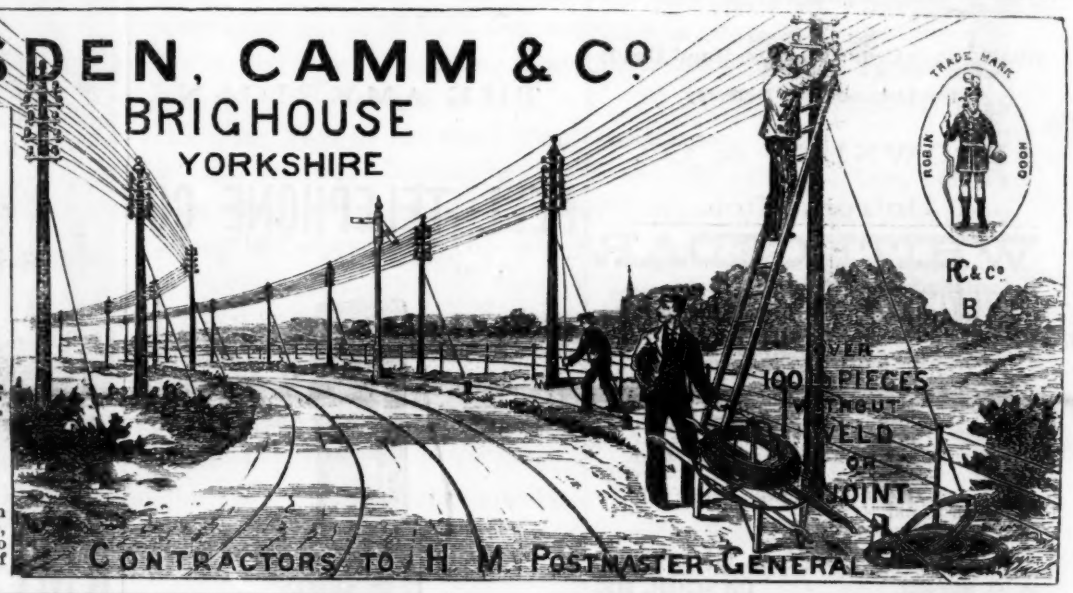

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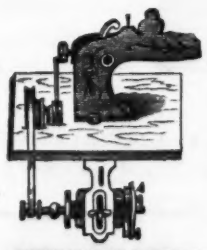

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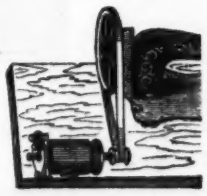

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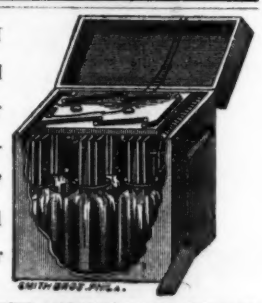

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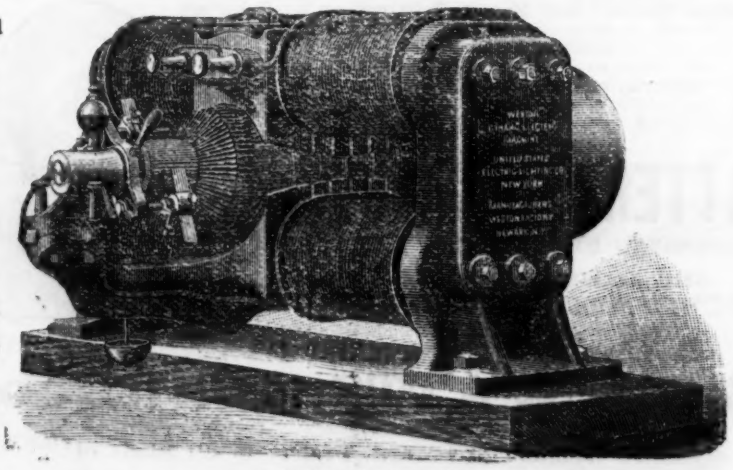

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